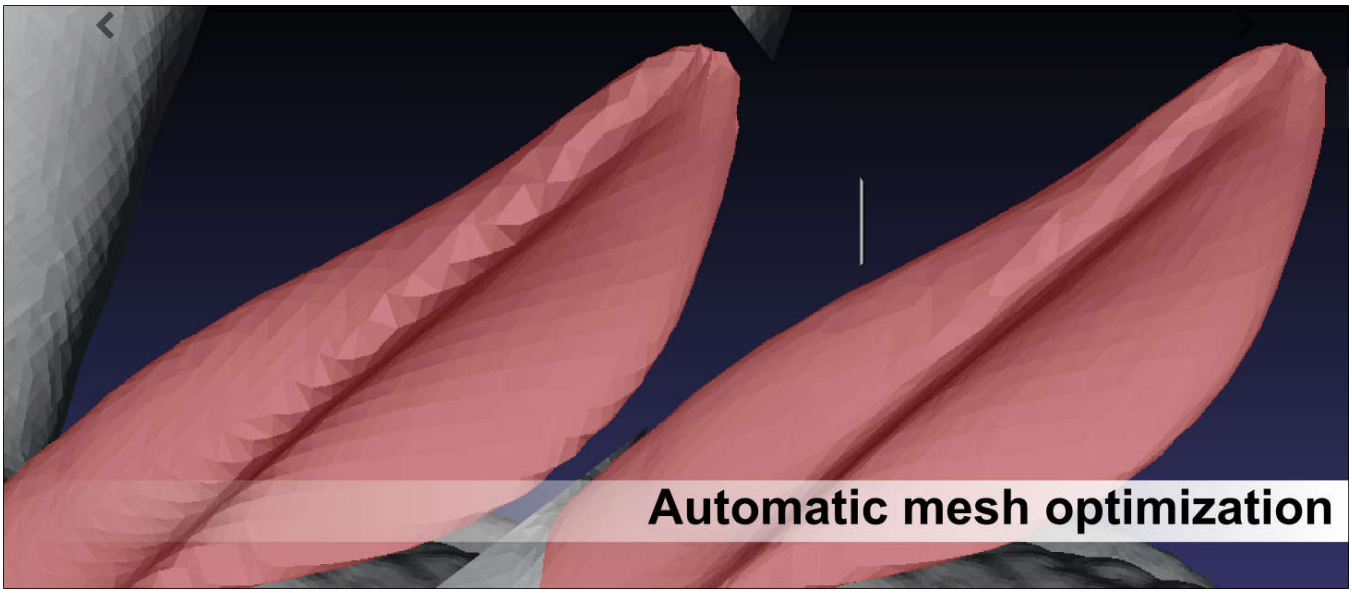
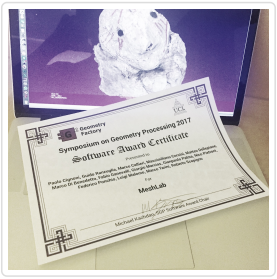
MeshLab the open source system for processing and editing 3D triangular meshes. It provides a set of tools for editing, cleaning, healing, inspecting, rendering, texturing and converting meshes. It offers features for processing raw data produced by 3D digitization tools/devices and for preparing models for 3D printing.



News

SGP Software Award

6/6/2017



(img/SGP_SW_Award.jpg)

We are proud to proud to announce that on July the 6th, at the Eurographics Symposium on Geometry Processing (SGP), MeshLab has been endowed with the prestigious **Eurographics Software Award**!

The award has been given for "*having contributed to the scientific progress in Geometry Processing by making the software available to the public such that others can reproduce the results and further build on them in their own research work*".

MeshLab 2016 Released

23/12/2016

After a very long time, a huge rewriting process, and a strongly renewed effort the new MeshLab version is finally out!

- Total rewriting of the internal rendering system. Huge rendering speed ahead!
- Screened Poisson Surface Reconstruction updated to the very latest version.
- New Transformation filters.
- New ways of getting metric information out of your models.
- Transformation matrices are now used more uniformly among filters.
- Alpha value is now used properly by all color-related filters.
- Improvement and typos removal on various help/description texts.
- Direct upload of models on SketchFab
- Raster registration on 3D model based also on 2D/3D correspondences
- Bug-fixing on almost all filters.

Download

MeshLab 2016

23/12/2016

Note: on MacOS, the first time you run MeshLab, right click on the icon and choose open to explicitly confirm the start.

Win 64 (http://github.com/cnr-isti-vclab/meshlab/releases/download/v2016.12/MeshLab2016.12.exe)

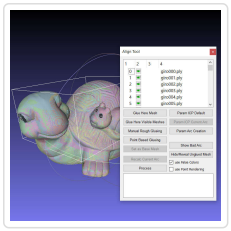
MacOS (http://github.com/cnr-isti-vclab/meshlab/releases/download/v2016.12/MeshLab2016.12.dmg)

Linux Snap (https://uappexplorer.com/snap/ubuntu/meshlab)

Sources (http://github.com/cnr-isti-vclab/meshlab/archive/v2016.12.tar.gz)

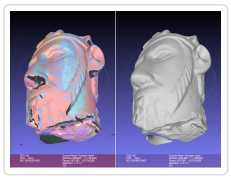
Features

3D Acquisition: Aligning



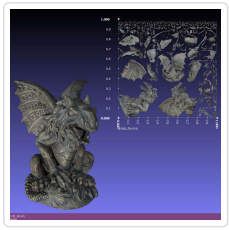
The 3D data alignment phase (also known as registration) is a fundamental step in the pipeline for processing 3D scanned data. MeshLab provides a powerful tool for moving the different meshes into a common reference system, able to manage large set of range-maps. MeshLab implements a fine tuned ICP one-to-one alignment step, followed by a global bundle adjustment error-distribution step. The alignment can be performed on meshes and point clouds coming from several sources, including active (both short- and long-range) scanners and 3D-from-image tools.

3D Acquisition: Reconstruction



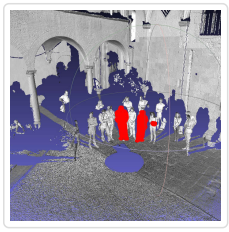
The process of transforming independent acquisitions, or point clouds, into a single-surface triangulated mesh can be fulfilled with different algorithmic approaches. MeshLab provides several solutions to reconstruct the shape of an object, ranging from volumetric (Marching Cube) to implicit surfaces (Screened Poisson).

3D Acquisition: Color Mapping and Texturing



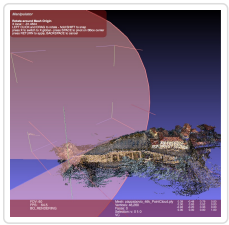
Color information may be as important as geometry, but several acquisition technologies do not provide accurate appearance data. MeshLab contains a pipeline for the alignment and projection of color information (from a set of uncalibrated images) onto a 3D model. Several automatic and assisted methods are provided to obtain a high quality color encoding, with both per-vertex or texture mapping.

Cleaning 3D Models



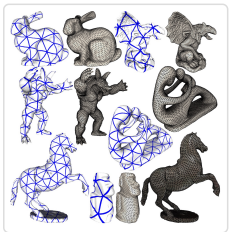
MeshLab offers a series of automatic, semi-manual and interactive filters to remove those geometric element generally considered “wrong” by most software and algorithms. It is possible to removing topological errors, duplicated and unreferenced vertices, small components, degenerated or intersecting faces, and many more geometrical and topological singularities. Using different automatic and interactive selection methods, is then possible to isolate and remove unwanted areas of your meshes and point clouds.

Scaling, Positioning and Orienting



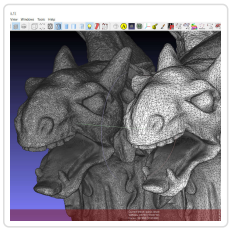
3D models, especially coming from survey and scanning, often need to be re-oriented, or placed in a specific reference system; additionally, if they have been generated from 3d-from-photos, they generally need scaling to become metric. MeshLab provides a variety of features to manipulate the scale, positioning and orientation of a 3D model, including basic transformation operations like translation/scaling/rotation, automatic re-centering and alignment to axis, geo-referencing with reference points, interactive manipulators for rotation/translation/scaling, and many others.

Simplification, Refinement and Remeshing



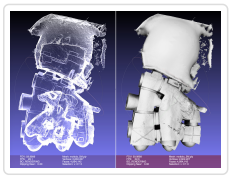
A common need when processing a 3D model is to reduce its geometric complexity, creating a geometry with the same shape but with less triangles (or points). MeshLab offers different ways to simplify (decimate) triangulated surfaces, able to preserve geometrical detail and texture mapping, or to selectively reduce the number of points in a pointcloud. In other cases, the user may want to increase the number of triangles (or points): MeshLab also provides different subdivision schemes, remeshing and resampling filters to increase geometric complexity of 3D models, or to optimize point distribution and triangulation quality.

Measurement, and Analysis



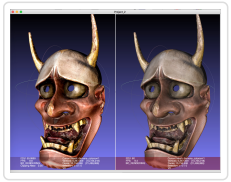
Interactive point-to-point measurement of a 3D model is really easy in MeshLab. Moreover, automatic filters will return various geometric and topological information about your 3D model (or just of a selected area), while the Sectioning tool can export cut-through sections of a mesh as polylines. Different geometric information (like curvature, geodesic distance, or local vertex density) may be calculated on meshes and 3D models using automatic filters.

Visualization and Presentation



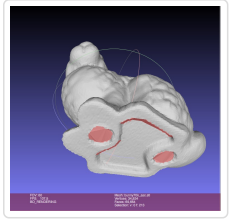
The visualization features of MeshLab (including Decorators and Shaders) can help in graphically present the peculiar characteristics of a 3D model. It is possible to control the camera perspective/orthographic view parameters, and use predefined canonical views. MeshLab also offers a high-resolution screenshot feature, extremely useful in creating a graphical documentation of a survey.

Color Processing



MeshLab can manipulate the vertex and face colors using a series of photoshop-like filters (gamma, saturation, brightness, contrast, levels, smoothing, sharpening). Automatic filters are available to calculate Ambient Occlusion and Volumetric Obscurance and to map it to vertex or face color. It is also possible to explicitly write color functions, to highlight specific characteristics of the 3D model. MeshLab also offers a painting interface for vertex colors. Scalar values, possibly the result of a metric calculation on the 3D surface, may also be mapped on vertex/face color, to have a visual representation of that value.

3D Printing: Offsetting, Hollowing, Closing

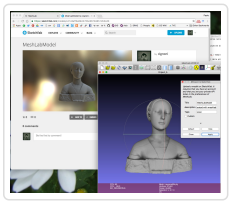


Beside being able to export to STL (one of the most common formats for 3D printing), MeshLab can be used to prepare 3D models for printing by creating inner shells, resampling/remeshing the 3D model to make slicing easier, closing small holes to obtain watertight meshes, and flattening the bottom area to have a better platform adherence.

Comparing Models

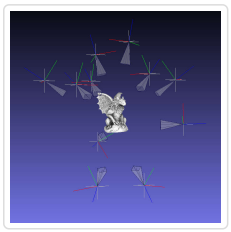
Measuring the geometric difference between two 3D models using Hausdorff Distance is a common approach in mesh processing. Many years ago (in 1997!), the Visual Computing Lab developed and freely distributed what become the standard tool for such task, Metro; the related paper has been cited more than one thousand times. While the original Metro tool was a small open source standalone command line program (still available at our web site), MeshLab offers now much more advanced functionalities for comparing two meshes, that also compute signed distance and may work on point clouds.

3D Models Conversion and Interchange



MeshLab can import and export a number of different 3D data formats and to online services like SketchFab. In this way it is possible for the user to interchange data with other tools (including Blender, Photoscan, VisualSfM, Cloud Compare, Autodesk tools), working in the context of complex 3D processing pipelines in a number of different contexts and applications. The scripting functionalities will make this type of use even easier and unattended.

Raster Layers: Integration with Images



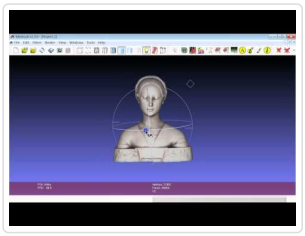
Raster Layers have been introduced in MeshLab to allow to go beyond the standard 3D model. MeshLab users can import in a project also images and other 2D entities. These Raster Layers can be used not only to project color information on the 3D model, but also to generate peculiar points of view, or store an entire 3d-from-image acquisition procedure by including also the images used for the generation of the final results.

Support

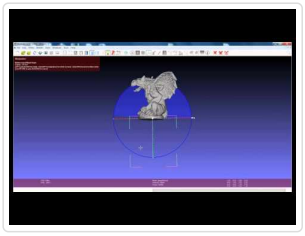
(https://www.youtube.com/user/MrPMeshLabTutorials) Mister P. (https://www.youtube.com/user/MrPMeshLabTutorials) YouTube tutorials

Basics (https://www.youtube.com/playlist?list=PL8B1E816EAE236B4D)

This playlist shows the basic concepts for the 3D model handling in MeshLab.



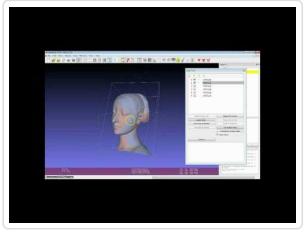
(https://www.youtube.com/playlist?list=PL8B1E816EAE236B4D)



Features (https://www.youtube.com/playlist?list=PL60mCsep96JcJz_SIfXblsVmI1TYMsQJc)

This playlist describes interesting features of MeshLab: edit, filters, decorations, that can be useful in your everyday "mesh processing" life.

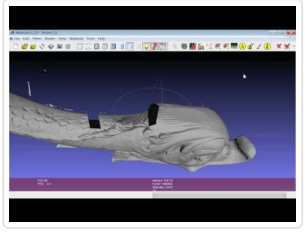
(https://www.youtube.com/playlist?list=PL60mCsep96JcJz_SIfXblsVmI1TYMsQJc)



3D Scanning pipeline (https://www.youtube.com/playlist?list=PL53FAE3EB5734126E)

This playlist describes the main steps of the scanning pipeline performed with MeshLab.

(https://www.youtube.com/playlist?list=PL53FAE3EB5734126E)



Cleaning (https://www.youtube.com/playlist?list=PLBBF41579E4B65566)

This playlist describes way to "clean" your mesh by removing unwanted geometry or attributes.

(https://www.youtube.com/playlist?list=PLBBF41579E4B65566)

Questions and Forum

For question, clarifications and any kind of doubts about MeshLab and how to get the best result with the various filters, use **stackoverflow**.
Be specific, and tag your questions with MeshLab.

Search Question (http://stackoverflow.com/que

Ask a Question (http://stackoverflow.com/ques

Bug Report

Please report on github **ONLY** bugs and malfunctioning. Please do not file as github issues questions about how to use MeshLab.

Before issueing a bug, **please**, read carefully *how to report a bug* (http://www.chiark.greenend.org.uk/~sgtatham/bugs

Report a Bug (https://github.com/cnr-isti-vclab

Bragging

For sharing nice pictures, reporting interesting experiences, thanking (or blaming) the developers, or just bragging on your last results, follow the official facebook MeshLab page (https://www.facebook.com/MeshLab).
Remember: do not ask technical questions on facebook. (facebook is neither easily searchable nor well indexed: any effort done in answering technical questions is a bit wasted)

MeshLab on (https://www.facebook.com/

Licensing

MeshLab sources are distributed under the GPL 3.0 Licensing Scheme. (https://github.com/cnr-isti-vclab/meshlab/blob/master/LICENSE.txt)
The 'MeshLab' name is a EUIPO trademark (https://euipo.europa.eu/eSearch/#details/trademarks/016505554) owned by CNR (http://www.cnr.it).

MeshLab Logos () are distributed under (cc) BY-SA (http://creativecommons.org/licenses/by-sa/4.0/)

Creative Commons Attribution-Sharealike 4.0 International License (http://creativecommons.org/licenses/by-sa/4.0/) and they can be freely used inside any wikimedia project.

References

The simplest way to show your appreciation of the MeshLab system is to remember citing it whenever you have used some of its functionalities. There are many publications related with MeshLab, in case of doubt use the first one, but, please, look through the list and cite also all the proper ones.

General MeshLab citation. It should be used whenever you use MeshLab for many small things during your research.	*P. Cignoni, M. Callieri, M. Corsini, M. Dellepiane, F. Ganovelli, G. Ranzuglia* **MeshLab: an Open-Source Mesh Processing Tool** Sixth Eurographics Italian Chapter Conference, page 129-136, 2008	bibTeX	PDF (http://vcg.isti.cnr.it/Publications/2008/CCCDGR08/MeshLabEGIT.final.pdf)
More specific citation if you have used the Meshlab in 3D scanning with color pipelines, like for example when you use MeshLab in a archeological project to finish up textured models.	*G. Ranzuglia, M. Callieri, M. Dellepiane, P. Cignoni, R. Scopigno* **MeshLab as a complete tool for the integration of photos and color with high resolution 3D geometry data** CAA 2012 Conference Proceedings, page 406-416, 2013	bibTeX	PDF ()
When using MeshLab for computing differences between meshes using Hausdorff Distance	*P. Cignoni, C. Rocchini, R. Scopigno* **Metro: measuring error on simplified surfaces** Computer Graphics Forum 17 (2), 167-174, 1998	bibTeX	PDF ()

When using MeshLab to generate well distributed (Poisson Disk) point sampling over mesh surfaces or when used to uniformly simplify large point clouds.	*G. Ranzuglia, M. Callieri, M. Dellepiane, P. Cignoni, R. Scopigno* **Efficient and Flexible Sampling with Blue Noise Properties of Triangular Meshes** IEEE Trans. on Visualization and Computer Graphics, Vol. 18, Num. 6, page 914--924, 2012	bibTeX	PDF (http://vcg.isti.cnr.it/Publications/2012/CCS12/TVCG-2011-07-0217.pdf)
When using Screened Poisson Surface Reconstruction algorithm to build a triangulated mesh out of a point cloud.	*M. Kazhdan, H. Hoppe* **Screened poisson surface reconstruction** ACM Transactions on Graphics (TOG), 32(3), 29, 2013	bibTeX	PDF (http://www.cs.jhu.edu/~misha/MyPapers/ToG13.pdf)
When using the isoparametric mesh parametrization algorithm for remeshing surfaces.	*Nico Pietroni, Marco Tarini, Paolo Cignoni* **Almost isometric mesh parameterization through abstract domains** IEEE Transaction on Visualization and Computer Graphics, Volume 16, Number 4, 2010	bibTeX	PDF (http://vcg.isti.cnr.it/Publications/2010/PTC10/Pietroni%20Tarini%20Cignoni%
When using the quad and tri-to-quad functionalities to automatically convert a triangular mesh into a quad mesh.	*M Tarini, N Pietroni, P Cignoni, D Panozzo, E Puppo* **Practical quad mesh simplification** Computer Graphics Forum 29 (2), 407-418 , 2010	bibTeX	PDF (http://vcg.isti.cnr.it/quadSemplif/Tarini%20Pietroni%20Cignoni%20Panozzo%20Pu
When using Radiance Scaling shader effect to enhance the surface features.	*R. Vergne, R. Pacanowski, P. Barla, X. Granier, C. Schlick* **Radiance scaling for versatile surface enhancement** Proceedings of the 2010 ACM SIGGRAPH symposium on Interactive 3D Graphics and Games (pp. 143-150). ACM, 2010	bibTeX	PDF (https://hal.inria.fr/inria-00449828/file/RadianceScaling.pdf)