



Universität
Basel

Research Project

Reconstruction of Complex Organic Shapes from Scanning Electron Microscopy Images

Project funded by own resources

Project title Reconstruction of Complex Organic Shapes from Scanning Electron Microscopy Images

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Organisation / Research unit

Departement Mathematik und Informatik / Computergraphik Bilderkennung (Vetter)

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Status Completed

The aim of this project is the reconstruction of the intricate shapes of microscopic animals from sequences of scanning electron microscopy (SEM) images which show the animal from multiple angles. The very complex geometry of those animals and the non-Lambertian reflectance behavior of surfaces under a SEM make this a very challenging task for state of the art multiview stereo methods.

Shapes reconstructed in this manner can be used to perform measurements and comparisons of SEM probes in 3D and they have already been successfully used to transfer the coloration from a few manually colorized keyframes to the entire sequence. The results of that project can be seen in the Natural Geographic IMAX movie, Mysteries of the Unseen World. We are also currently investigating the possibilities of creating physical copies of microscopic animals using additive manufacturing techniques, i.e. 3D printing.

Our current approach to the problem consists of tracking well observable edges through the image sequence and locating them in the process. Next, we need to distinguish edges delineating foreground features (occluding

contours) from edges running across surfaces. Finally, we reconstruct the actual shape using variational techniques applied to a voxel grid.

We are also working on an application of shape-from-shading to the SEM scenario.

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2801138	Vetter, Thomas	Martin Oeggerli	Micronaut AG	01.10.2012	30.09.2016