

Master thesis topic

Topic: Image filter preview with parameter space exploration

Volume data as for example acquired from computed tomography typically requires extensive processing for useful analysis. In many analysis pipelines, some simple, existing filters like smoothing or denoising need to be applied. Finding the right parameters to use for them can be a tricky task. The way this is often done at the moment requires applying the filter once, checking the results, then going back, applying the filter again with different parameters, and repeating this until the results converge on the expectation.

Within this project, a method and tool should be developed to provide an intelligent preview over the possible outcome from some image filter. This could for example be done by applying the filter multiple times with different parameters on a small part of the image, and showing these different versions in a matrix, as is for example available in 2D image processing software like Photoshop.

The method will be applied for a simple, already existing filter, for example one from the Insight Segmentation and Registration Toolkit (ITK). Ideally the devised method should be extensible very easily to additional filters with different parameters.

Keywords: image processing, image filter, parameter space exploration, visual analysis, comparative visualization

Starting literature:

- <http://www.itk.org/>
-
- A. J. Pretorius, M.-A. Bray, A.E. Carpenter and R.A. Ruddle, Visualization of parameter space for image analysis. IEEE Transactions on Visualization and Computer Graphics 17, 12 (Dec.2011), 2402–2411. doi:10.1109/TVCG.2011.253
- Bernhard Fröhler, Torsten Möller and Christoph Heinzl, GEMSe: Visualization-Guided Exploration of Multi-channel Segmentation Algorithms. Computer Graphics Forum (Proceedings of the Eurographics Conference on Visualization (EuroVis) 2016, 35 (3). ISSN 0167-7055 (2016) <https://eprints.cs.univie.ac.at/4633/>

Advisor:

Bernhard Fröhler (bernhard.froehler@fh-wels.at)