

Achieving 3D Imaging through Focus Stacking

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Image Stacking is a process by which a series of images of the same object taken at different focal depths are combined to form one in-focus image with significant depth. This process - sometimes referred to as focus stacking - allows users to view samples with a greater level of detail without resorting to constantly adjusting the camera position or focus. In addition to the merged image, image stacking also allows for a form of 3D reconstruction, even with a single stationary camera, which is not possible with photogrammetry or stereo reconstruction. As we construct the merged image from the data, a depth map of all of the images is also generated during the edge detection phase which carries the 3D information of the object.

The computer vision techniques, including image stacking, have been successfully applied to visualizations using beamline on-axis microscopes for sample imaging and X-ray beam characterization. One can apply the same techniques and tools developed for sample imaging to enhance the processing of TXM and PXM images.

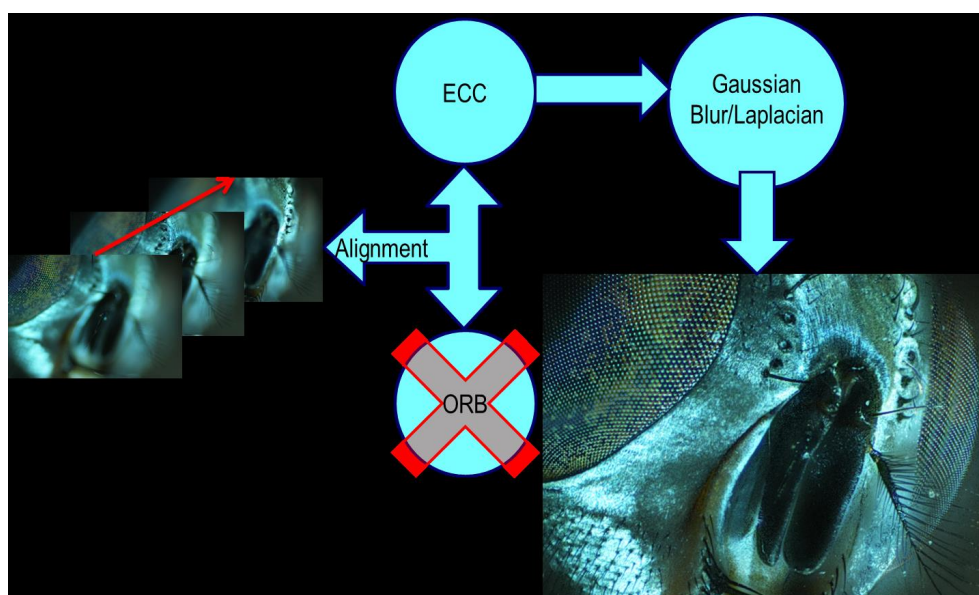


Image Stacking methods used here in the process of 3D reconstruction.

References

- [1] I. K. J. Gofron, J. Wlodek, Y. Cai, "ON-AXIS 3D MICROSCOPE FOR X-RAY BEAM-LINES AT NSLS-II" , <http://accelconf.web.cern.ch/AccelConf/icalcps2017/papers/webpl02.pdf>, doi:10.18429/JACoW-ICALPCS2017-WEBPL02