Synergistic Integration of Feature Recognition and Analysis for Chemical Imaging Data

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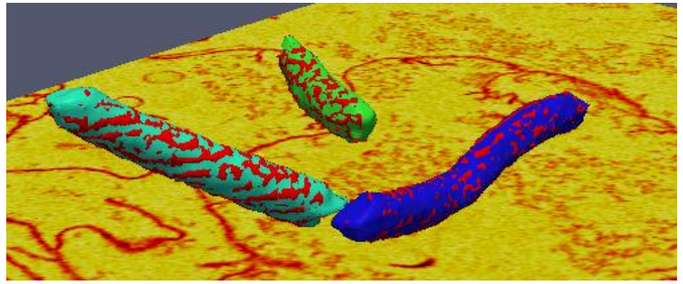
Purpose

The project will result in the foundation for new and unique signature capabilities at PNNL for performing image analysis and feature recognition of very large (gigabyte to petabyte) spatial time-varying datasets. This will enable rapid feedback to the researcher, thus influencing the decision-making process during the imaging session.



Isolating bacteria features (blue, teal, and green) in relation to signal indicating Uranium (red).

Expected Outcomes

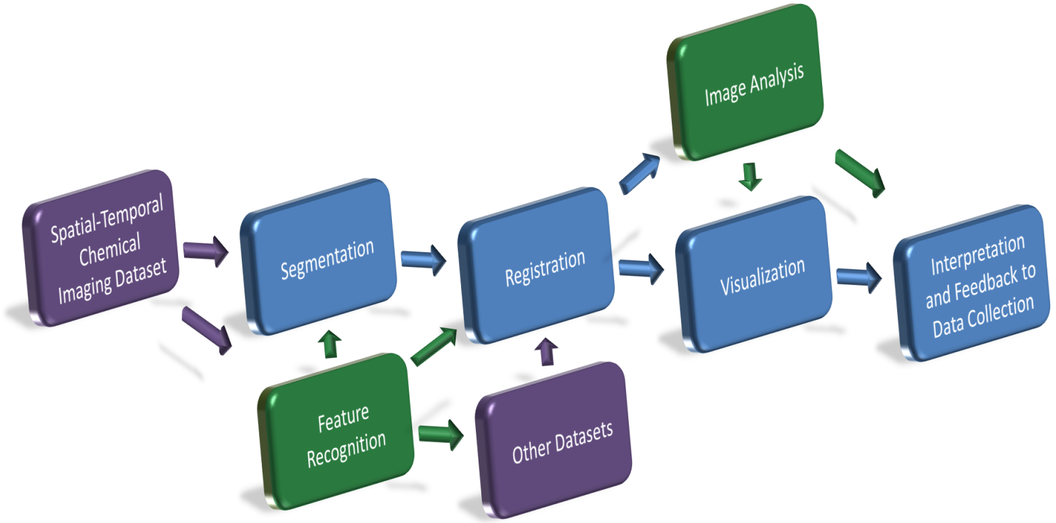
High performance parallelized toolkit for analyzing chemical imaging data, placing data in spatial-functional context, and optimizing multimodal data integration.

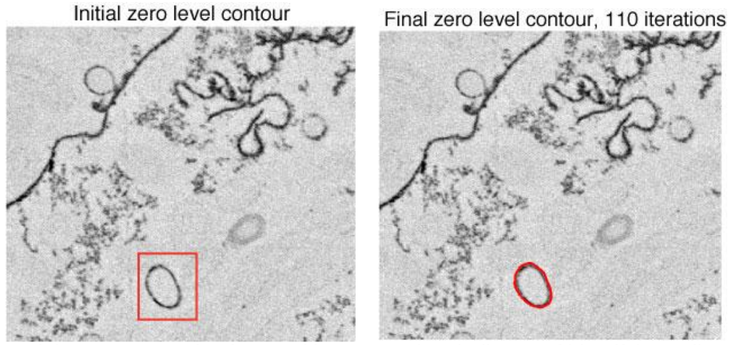
Progress

Developing an advanced suite of tools for feature recognition and segmentation based on energy minimization with *Graph Cuts*, *Random Walks,* and the *Power Watershed* framework.

Establishment of validation data for identification of 3D bacteria.

Recruitment of a new hire in field of image processing software development.





An inhomogeneous background increases the challenge of identifying cells from natural backgrounds and substrates such as biofilms.

Recent Related Manuscripts

Kindle LM, Kakadiaris IA, Ju T, Carson JP (2011) A semi-automated approach for artifact removal in serial tissue cryosections. *Journal of Microscopy*

Enlow MA, Ju T, Kakadiaris IA, Carson JP (*in press*) Lossless 3-D reconstruction of semi-quantitative data. EMBC 2011

Einstein et al. (*in progress*) Efficient algorithms for mapping imaging data to 3D unstructured grids. *Computational Biomechanics*