Title:

Generative adversarial networks for creating realistic training data for machine learning-based segmentation of FIB tomography data

Keywords:

Domain adaptation, Fast simulation, Synthetic data, FIB-SEM tomography, 3D reconstruction

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Abstract of the paper:

Accurate 3D reconstruction of the structure of nanomaterials is essential for studying their physical properties. Focused Ion Beam (FIB) tomography is a preferred method for creating 3D image stacks of micrometer-sized material volumes at nanometer resolution. To achieve valid 3D reconstructions from FIB tomography data, segmentation of these images using machine learning-based methods is often beneficial. However, supervised machine learning requires a large amount of training data and ground truth, which is challenging because FIB tomography is a destructive technique. This motivates the use of synthetic training data generated with Monte Carlo simulations of the FIB tomography process. However, these simulations are computationally expensive, and the resulting synthetic imaging data still differs from real FIB tomography data in terms of the statistical distribution of various features. In this study, we propose a novel approach to overcome both problems by using generative adversarial networks.