

Deep Learning for Synchrotron X-ray Imaging

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X-ray imaging scans at today's synchrotron light sources can yield thousands of image frames per second at high resolution. Current and expected data volumes and rates necessitate having reliable, efficient, and fully automated data processing pipelines. Traditional image processes are difficult to be modeled and are not robust enough for the data with complex patterns and noises. Deep learning methods have proved the great potential for the image process. I will present our previous work of solving synchrotron X-ray imaging problems with deep neural networks, including three fundamental functions: image classification, image transformation, and a solver of inverse problems. I applied these functions for tomographic rotation axis calibration, low-dose tomography enhancement, super-resolution X-ray microscopy, X-ray image segmentation, missing angle tomography reconstruction, and phase retrieval. The relevant codes are released in the open-source software: Xlearn toolbox.