

Predicting Geometric Parameters of 2D XRD Detector for Image Calibration Using Supervised Machine Learning

Fang Ren, Apurva Mehta

Stanford Synchrotron Radiation Lightsource, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA.

Investment in brighter sources and large area detectors has accelerated the speed of data acquisition at national user facilities. However, calibration of detector positions (5 parameters in total) remains to be the time-limiting step during data processing – transferring raw images into calibrated images and spectra. Currently, in order to keep up with the data acquisition rate, the detector position is kept the same throughout the experimental cycle, so that only one calibration is needed. However, stationary detectors will not be able to fulfill the needs of diverse materials properties. Herein, we present a method to automate the calibration with the help of supervised machine learning. The model can predict the geometric parameters with an accuracy of 96%.

