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Deep learning based approach for speeding up the extraction of morphological parameters in GISAXS data

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In situ grazing incidence small angle X-ray scattering (GISAXS) is a powerful tool for accessing nanoscale structure formation in real time with high time resolution and high statistical relevance. However, the analysis is clearly time consuming and challenging task, necessitating the need for strategies to speed up the process. In this context we introduce a two-step method that incorporates a pre-processing of GISAXS simulations, which are employed to train a neural network (NN). The NN is subsequently utilized to predict the average cluster radius and distance of the model system gold on silica. There are multiple aspects of the method that require detailed characterization. Here, we focus on the effects of using intensity thresholds in the pre-processing step and on the relationship between the network architecture and the distribution of results. As part of ongoing research, we are investigating different configurations and examining their direct impact on the predictive capabilities of the NN. This iterative refinement process aims not only to improve the effectiveness of the approach for the specific system, but also to lay the foundation for its applicability to broader material systems in the field of GISAXS data analysis.

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