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A Deep Learning approach for Gamma spot removal in CCD-based neutron imaging

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Neutron imaging is a powerful tool for non-destructive investigations in many applications. However, neutron radiography images are frequently degraded due to the interaction between gamma photons or scattered neutrons with the camera sensor. The resulting high intensity gamma spots will interfere the following quantitative analysis and 3D CT reconstruction. There already exist various gamma spots denoising methods using a “Find & Replace” strategy. However, fine parameters tuning is required to achieve a good performance. In this work, we propose a fully convolutional neural network architecture based gamma spot denoiser (FCDGSD). Experiments show that our FCDGSD method can achieve similar quality as the start-of-the-art “Find & Replace” method, but provides a roughly 10-fold increase in performance. Moreover, we eliminated the need for human intervention of “Find & Replace” for finding the best hyper-parameters for each experimental setup.

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