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Application of a neural network based technique for track identification in Nuclear Track Detectors (NTD)

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Nuclear Track Detectors (NTDs) have been in use for decades, mainly as detectors of heavily ionizing particles. Existence of natural thresholds of detection makes them an ideal choice as detectors in the search for rare, heavily ionizing hypothesized particles (e.g. Monopoles, Strangelets etc.) against a large low-Z background in cosmic rays as well as particle accelerators. But identification of particle tracks in NTDs presents a significant challenge, with conventional image analysis software coming up short, requiring the intervention of human experts. This makes the job of scanning NTDs a painstakingly slow process, prone to human errors. In recent years, the use of Machine Learning techniques has opened up the possibilities of new advances in image analysis. In this work, we have taken a technique combining sequential application of convolution and de-convolution previously developed by us and further upgraded it with the use of Artificial Neural Network. This has further reduced the need for manual intervention, is producing better results than commercially available software and is promising to dramatically speed up the scanning process, thereby facilitating the more widespread adaptation of NTDs.

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