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TrackNET: Deep Learning-Based Track Recognition in Pixel and Strip-Based Particle Detectors

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The reconstruction of charged particle trajectories in tracking detectors is crucial for analyzing experimental data in high-energy and nuclear physics. Processing of the vast amount of data generated by modern experiments requires computationally efficient solutions to save time and resources. In response, we introduce TrackNET, a recurrent neural network specifically designed for track recognition in pixel and strip-based particle detectors. TrackNET acts as a scalable alternative to the Kalman filter, exemplifying local tracking methods by independently processing each track-candidate. We rigorously tested TrackNET using the TrackML dataset and simulated data from the straw tracker of the SPD experiment at JINR, Dubna. Our results demonstrate significant improvements in processing speed and accuracy. The paper concludes with a comprehensive analysis of TrackNET's performance and a discussion on its limitations and potential enhancements.

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