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Unraveling Time-Slices of Events in SPD Experiment

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Event reconstruction in the SPD (Spin Physics Detector) experiment in the NICA mega-science project presents a significant challenge of processing a high data flow with limited valuable events. To address this, we propose novel approaches for unraveling time slices. With a data rate of 20 GB/sec and a pileup of about 40 events per time slice, our methods focus on efficient event reconstruction and selection. We explore predictive vertex clustering, utilizing hits from reconstructed tracks to predict vertices using Gradient Boosting methods for subsequent clustering. Additionally, we develop a triplet siamese network that generates track feature vectors for effective clustering. Furthermore, we introduce a novel technique for evaluating event separation quality, enabling a comprehensive assessment of each unraveling approach. Our research contributes to the real-time analysis and event selection in the SPD experiment and provides insights into the challenges and opportunities of time-slice unraveling in high-intensity physics experiments.

Summary

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