

Connecting The Dots 2023



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Studying a new Primary Vertex (PV) identification algorithm within ACTS framework

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We present a project proposal aimed at improving the efficiency and accuracy of Primary Vertex (PV) identification within the 'A Common Tracking Software'(ACTS) framework using the deep learning techniques. Our objective is to establish a primary vertex finding algorithm with enhanced performance for the LHC like environments. This work is focused on finding PVs in simulated ACTS data using a hybrid approach that started with the Kernel Density Estimators (KDEs), analytically derived from the ensemble of charged track parameters, which are then fed to a UNet/UNet++ neural network along with truth PV information. The neural network is trained using a large training dataset and the performance is evaluated on an independent test dataset. By leveraging KDEs and neural networks, our aim is to enhance pattern recognition and feature detection in High Energy Physics (HEP) data. We also plan to conduct a comparative analysis to assess the performance of the newly implemented algorithm against established results from ACTS Adaptive Multi-Vertex Finder (AMVF) algorithm. This work aims to contribute to the ongoing development of data analysis and machine learning techniques in the field of HEP.

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