Abstract Submitted
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Machine-Learning Assisted Muography SADMAN AHMED SHANTO, Texas Tech University — We report on a design of a computationally efficient parallelized framework to analyze the large data volume generated by our muon tomography detector. The detector consists of plastic scintillator counters with photomultiplier tubes and a CAMAC data acquisition system with analog-to-digital, time-to-digital, and scaler modules. Our system relies on a delay-line technique which reduces the number of readout channels significantly. We discuss applications of machine-learning inspired techniques for generating higher fidelity images compared to what is possible by traditional image reconstruction algorithms. The sequential emission file generated by the detector makes it an ideal platform for training Recurrent Neural Networks (RNNs) which recast the problem of predicting "next hits" as an optimization problem. Long Short-Term Memory (LSTMs) networks to contextualize the entire data frame are also utilized which provide an additional constraint on the training policy for the RNNs making the regime even more robust. Image Segmentation (IS) is finally used to generate a pixel map that extracts shape information of target object which constitutes the final constraint layer for the RNN training routine.

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