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## Improving Computational Performance of ATLAS GNN Track Reconstruction Pipeline

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Track reconstruction is an essential element of modern and future collider experiments, including the ATLAS detector. The HL-LHC upgrade of the ATLAS detector brings an unprecedented tracking reconstruction challenge, both in terms of the large number of silicon hit cluster readouts and the throughput required for budget-constrained track reconstruction. Traditional track reconstruction techniques often contain steps that scale combinatorially, which could be ameliorated with deep learning approaches. The GNN4ITk project has been shown to apply geometric deep learning algorithms for tracking to a similar level of physics performance with traditional techniques while scaling sub-quadratically. In this contribution, we compare the computational performance of a variety of pipeline configurations and machine learning inference methods. These include heuristic-and-ML-based graph segmentation techniques, GPU-based module map graph construction, and studies of high throughput graph convolutional kernels. In this contribution, we present benchmarks of latency, throughput, memory usage, and power consumption of each pipeline configuration.

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