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Applying and optimizing the Exa.TrkX Pipeline on the OpenDataDetector with ACTS

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Machine learning is a promising field to augment and potentially replace part of the event reconstruction of high energy physics experiments. This is partly due to the fact that many machine learning algorithms offer relatively easy portability to heterogeneous hardware, and thus could play an important role in controlling the computing budget of future experiments. In addition, the capability of machine learning based approaches to tackle non-linear problems can bring performance improvements. Particularly, the track reconstruction problem has been addressed in the past with several machine learning based attempts, largely facilitated by the two highly resonant machine learning challenges (TrackML). The Exa.TrkX project has developed a track finding pipeline based on graph neural networks that has shown good performance when being applied to the TrackML detector. We will present the technical integration of the Exa.TrkX pipeline into the framework of the ACTS (A Common Tracking Software) project. As far as we know, this is the first integration of an GNN pipeline in a production tracking framework. We will further show our efforts to apply the pipeline to the OpenDataDetector, a model of a more realistic detector that supersedes the TrackML detector. The tracking performance results in this setup will be compared with those of the ACTS standard track-finder, the Combinatorial Kalman Filter. Alongside this, we will present other developments in the context of building and optimizing a full chain example using Exa.TrkX in ACTS.

In-person participation

Yes

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