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Accelerating End-to-End Deep Learning for Particle Reconstruction using CMS open data

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Machine learning algorithms are gaining ground in high energy physics for applications in particle and event identification, physics analysis, detector reconstruction, simulation and trigger. Currently, most data-analysis tasks at LHC experiments benefit from the use of machine learning. Incorporating these computational tools in the experimental framework presents new challenges.
This paper reports on the implementation of the end-to-end deep learning with the CMS software framework and the scaling of the end-to-end deep learning with multiple GPUs.
The end-to-end deep learning technique combines deep learning algorithms and low-level detector representation for particle and event identification. We demonstrate the end-to-end implementation on a top quark benchmark and perform studies with various hardware architectures including single and multiple GPUs and Google TPU.

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