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FlashSim at CMS: performance and resources of deep learning based simulation for HEP

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The CMS FlashSim simulation framework is an end-to-end ML based simulation that can speed up the time for production of analysis samples of several orders of magnitude with a limited loss of accuracy. Detailed event simulation at the LHC is taking a large fraction of computing budget. As the CMS experiment is adopting a common analysis level format, the NANO AOD, for a larger number of analyses, such an event representation is used as the target of this ultra fast simulation that we call FlashSim. Generator level events, from PYTHIA or other generators, are directly translated into NANO AOD events at several hundred Hz rate with FlashSim. CMS showed how training FlashSim on a limited number of full simulation events is sufficient to achieve very good accuracy on larger datasets for processes not seen at training time. In this work, we focus on presenting the usage of compute resources for this new framework, for both training and inference, and try to establish a comparison with the full simulation of the CMS experiment.

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