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A containerized solution for fast calorimeter simulation

The simulation of electromagnetic and hadronic interactions in calorimeters is a very demanding process, both in terms of time and computing resources. A novel technique based on Generative Adversarial Networks (GANs) may benefit from a more efficient use of computing resources, although initial training could be computationally demanding. Nowadays and in the near future we expect to have more computing facilities available, albeit they may have different setup (different OS and schedulers, number of available CPUs per computing node, presence of computing accelerators···).
In this contribution we present a model of calorimeter simulation based on GANs which trains simultaneously two neural networks: a generator which, given Geant4-simulated data as training sample, aims at generating sample the most similar to it and a discriminator which, fed data from both the training sample and the generator-produced Geant4-like sample, tries distinguishing actual Geant4 data from generator-produced data. When finished training, our model simulates calorimeter response as similarly as possible to Geant4, but much faster. In this contribution, training data are the CaloChallenge public ones. We also present a general framework based on containers to ensure full portability of the code through different computing clusters: in this way, our framework may run not only on HEP-specific resources, but also on supercomputing clusters providing further and more powerful resources.

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