Contribution ID : **8** Type : **Talk**

Machine Learning methods for simulating particle response in the Zero Degree Calorimeter at the ALICE experiment, CERN

Friday, 16 September 2022 12:10 (30)

Currently, over 50% of the computing power at CERN's GRID (>500 000 CPUs in 170 centres) is used to run High Energy Physics simulations. The recent updates at the Large Hadron Collider (LHC) create the need for developing more efficient simulation methods. In particular, there exist a demand for a fast simulation of the neutron Zero Degree Calorimeter, where existing Monte Carlo-based methods impose a significant computational burden.

We propose an alternative approach to the problem that leverages machine learning. Our solution utilises neural network classifiers and generative models to directly simulate the response of the calorimeter. In particular, we examine the performance of variational autoencoders and generative adversarial networks, expanding the GAN architecture by an additional regularisation network and a simple, yet effective postprocessing step.

Our approach increases the simulation speed by 2 orders of magnitude while maintaining the high fidelity of the simulation.

Primary author(s) : DUBIŃSKI, Jan (Warsaw University of Technology); DEJA, Kamil (Warsaw University of Technology); WENZEL, Sandro (CERN); ROKITA, Przemysław (Warsaw University of Technology); TRZCIŃSKI, Tomasz (Warsaw University of Technology, Tooploox, Jagiellonian University)

Presenter(s) : DUBIŃSKI, Jan (Warsaw University of Technology)

Session Classification : Machine Learning in Particle Physics and Astrophysics