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Generative models for fast simulation

Tuesday, August 22, 2017 9:30 AM (30 minutes)

Machine Learning techniques have been used in different applications by the HEP community: in this talk, we discuss the case of detector simulation. The need for simulated events, expected in the future for LHC experiments and their High Luminosity upgrades, is increasing dramatically and requires new fast simulation solutions. We will present results of several studies on the application of computer vision techniques to the simulation of detectors, such as calorimeters. We will also describe a new R&D activity within the GeantV project, aimed at providing a configurable tool capable of training a neural network to reproduce the detector response and replace standard Monte Carlo simulation. This represents a generic approach in the sense that such a network could be designed and trained to simulate any kind of detector and, eventually, the whole data processing chain in order to get, directly in one step, the final reconstructed quantities, in just a small fraction of time. We will present the first three-dimensional images of energy showers in a high granularity calorimeter, obtained using Generative Adversarial Networks.

Presenter: VALLECORSA, Sofia (Gangneung-Wonju National University (KR))

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