Contribution ID: **9** Type: **not specified**

Refining particle detector simulations using the Wasserstein distance in adversarial networks

Machine learning models, especially deep neural networks produce appropriate predictions when working on a test set similar to the training set. In physics research machine learning models are usually designed to be used for data application but trained on simulations. Therefore, differences between simulations and data can cause substantial uncertainties in the application.
Here we attempt to reduce these differences by adapting the Wasserstein GAN (WGAN) concept.
WGANs have recently been introduced as technological progress in the field of generative models by avoiding mode collapsing, ensuring adequate gradients and providing a meaningful loss metric.
We adapt the WGAN concept and apply it within a method to reduce data-simulation mismatches by refining the simulated data. For our investigations we used a calorimeter measuring spatially distributed signal patterns induced by cosmic rays.
We demonstrate that training a deep network with the refined simulated signals leads to a more precise energy reconstruction of events compared to training a network with the simulated signals which differ from data signals. Details can be found in arXiv:1802.03325.

Intended contribution length

20 minutes

Primary authors: Prof. ERDMANN, Martin; Mr GEIGER, Lukas; Mr GLOMBITZA, Jonas; Mr SCHMIDT, David Josef

Presenter: Mr GLOMBITZA, Jonas

Session Classification: Session 3