Contribution ID: **606** Contribution code: **contribution ID 606** Type: **Poster**

GAN with an Auxiliary Regressor for the Fast simulation of the Electromagnetic Calorimeter Response

High energy physics experiments essentially rely on the simulation data used for physics analyses. However, running detailed simulation models requires tremendous amount of computation resources. New approaches to speed up detector simulation are therefore needed. \\
Generation of calorimeter responses is often the most expensive component of the simulation chain for HEP experiments.
It has been shown that deep learning techniques especially Generative Adversarial Networks may be used to reproduce the calorimeter response. However, those applications are challenging, as the generated responses need evaluation not only in terms of image consistency, but different physics based quality metrics should be taken into consideration as well. \\
In our work, we develop a multitask GAN-based framework with the goal to speed up the response generation of the Electromagnetic Calorimeter (ECAL) of the LHCb detector at LHC. We introduce the Auxiliary Regressor as a second task to evaluate a proxy metric of the given input that is used by the Discriminator. We show that this approach improves the stability of GAN and the model produces samples with the physics metrics distributions closer to original ones than the same architecture without additional loss.

Significance

In this research we research new GAN architecture, inspired by multitask approach, that helps us to improve the best previously published generation results in terms of physics. We suppose that this method may be used to improve GAN performance in other applications, but it should be studied and seems to be a topic for the future work.

References

https://indi.to/RfwKz

Speaker time zone

Compatible with Europe

Authors: ROGACHEV, Alexander (National Research University Higher School of Economics (RU), Yandex School of Data Analysis (RU)); RATNIKOV, Fedor (Yandex School of Data Analysis (RU))

Presenter: ROGACHEV, Alexander (National Research University Higher School of Economics (RU), Yandex School of Data Analysis (RU))

Session Classification: Posters: Broccoli

Track Classification: Track 2: Data Analysis - Algorithms and Tools