

GammaLearn: Deep learning applied to the Cherenkov Telescope Array data analysis

mercredi 22 janvier 2020 14:50 (25 minutes)

The Cherenkov Telescope Array (CTA) is the next generation of ground-based gamma-ray telescopes. Two arrays will be deployed composed of 19 telescopes in the Northern hemisphere and 99 telescopes in the Southern hemisphere. Observatory operations are planned to start in 2021 but CTA is currently in pre-production phase, prototypes already producing data, and first data from on site prototypes should be available already in 2019. Due to its very high sensitivity, CTA will record a tremendous amount of data that represent a computing challenge to the reconstruction software. Moreover, the vast majority of triggered events come from protons whereas only photons are of interest for the study of astrophysical sources.

Since the 2012 Imagenet breakthrough, deep learning advances have shown dramatic improvements in data analysis across a variety of experiments. These deep learning algorithms look particularly suited to the task of analysing CTA's simulated and real data. Moreover, the trained neural networks show very good computing performances during execution.

Here we present a deep multi-task learning architecture applied to CTA simulated data to perform the energy and direction reconstruction of the particles as well as the discrimination of gamma photons among cosmic rays. This architecture is implemented with indexed operations allowing to process specific CTA camera images without preprocessing.

Auteurs principaux: JACQUEMONT, Mikaël; Dr VUILLAUME, Thomas (LAPP, CNRS)

Co-auteurs: BENOIT, Alexandre; Prof. LAMBERT, Patrick (LISTIC, Université Savoie Mont Blanc); Dr MAURIN, Gilles (LAPP - Université Savoie Mont-Blanc); LAMANNA, Giovanni (LAPP - IN2P3/CNRS)

Orateur: JACQUEMONT, Mikaël

Classification de thématique: ML for data reduction : Application of Machine Learning to data reduction, reconstruction, building/tagging of intermediate object