Contribution ID: **68** Type: **oral**

Localizing and Classifying Gamma-Ray Sources Using Deep Neural Network

Wednesday, 27 October 2021 15:25 (25 minutes)

Due to the dominating presence of diffuse emission at GeV energies, detecting and localizing (faint) gamma-ray point sources in the Fermi-LAT data is a challenging task. Going beyond traditional statistical methods, here we show the application of deep learning and computer vision algorithms to localize and classify gamma-ray point sources starting from the raw Fermi-LAT sky images. We prepare the training data based on 10 years of Fermi-LAT exposure and we use the source properties of active galactic nuclei (AGNs) and pulsars (PSRs) from the incremental version of the fourth Fermi-LAT source catalog (4FGL-DR2). Relative to our previous work, here our training data is more robust, contains yearly flux variation, exploits full detector potential with increasing spatial resolution from lowest to highest energies, covering 300 MeV to 1 TeV. The localization methods developed and applied for the gamma-ray sources, are also tested for astrophysical sources seen in optical wavelengths. The localized gamma-ray sources are then fed into a different deep neural network suitable for the classification of various point source classes. The complete data analysis pipeline for automatic point source search and classification methods using deep learning could prove to be a competitive alternative to traditional algorithms for catalog preparation.

Please choose the session this abstract belongs to

Gamma rays

Primary authors: Mr OETELAAR, Chris Van Den (Radboud University); BHATTACHARYYA, Saptashwa (University of Nova Gorica)

Co-authors: Mr PANES, Boris (Pontificia Universidad Católica de Chile); Mrs ZAHARIJAS, Gabrijela (University of Nova Gorica); Mr JÓHANNESSON, Guðlaugur (Science Institute, University of Iceland); Mr AUSTRI, Roberto Ruiz (Instituto de Física Corpuscula); Mr CARON, Sascha (Radboud University)

Presenter: BHATTACHARYYA, Saptashwa (University of Nova Gorica)

Session Classification: Session 1