

Studies of Gamma-Ray Shower Reconstruction Using Deep Learning

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What is this contribution about?

In “Studies of Gamma-Ray Shower Reconstruction Using Deep Learning” we have investigated the use of Convolutional Neural Networks (CNNs) when reconstructing the gamma ray primary from the gamma-ray shower footprint detected by an array of Water Cherenkov Detectors.

Why is it relevant?

Arrays of particle detectors are a complementary technology to the traditional IACT observatories that have much larger fields of view, but techniques for accurate reconstruction of gamma-rays using this technology are not yet using the latest advances in computer vision.

What have we done?

We created a convolutional neural network that uses simulated events from the proposed ALTO array to reconstruct the Energy and depth of shower maximum (X_{\max}), and we investigated the importance of data pre-processing to get the best results compared to a traditional machine learning approach.

What is the result?

It is challenging to reconstruct low energies with particle detectors; the CNN proved better at reconstructing X_{\max} compared to the traditional machine learning, indicating that in the data there are unexplored correlations between the observables and X_{\max} .

