Boosting the Performance of the Neural Network Using Symmetry Properties for the Prediction of the Shower Maximum Using the water-Cherenkov Detectors of the Pierre Auger Observatory as an Example

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What is this contribution about?

The contribution presents a way of exploiting planar detector symmetries to reduce the phase space of problems and to work memory efficient.

Why is this relevant/interesting?

This method is an easy way of boosting complex analysis approaches without the need of modifying them to account for these underlying symmetries.

What has been done?

We have used the method to boost the prediction of the shower depth X_{max} by a neural network using the intrinsic symmetries of the Surface Detector of the Pierre Auger Observatory.

What is the result?

Despite the restrictions due to the finite reconstruction accuracy and the assumptions used, the approach works well, is easy to implement, and generalizable.