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Using conditional variational autoencoders to generate images from atmospheric Cherenkov telescopes

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Monte Carlo method is commonly used to simulate Cherenkov telescope images of atmospheric events caused by high-energy particles. We investigate the possibility of augmentation the Monte Carlo-generated sets using other methods. One of these methods is variational autoencoders.

We trained conditional variational autoencoders (CVAE) using a set of Monte Carlo-generated images from one Cherenkov telescope of TAIGA experiment for atmospheric events caused by gamma quanta (gamma events). Images generated by the trained autoencoders are similar to the Monte Carlo images, in particular, an average score by a classifier trained to distinguish Monte Carlo generated images of gamma events is 0.982-0.986 for one of the autoencoders, compared to 0.99 for Monte Carlo images.

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