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Energy reconstruction in analysis of Cherenkov telescopes images in TAIGA experiment using Deep Learning methods

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Imaging Atmospheric Cherenkov Telescopes (IACT) of TAIGA astrophysical complex allow to observe high energy gamma radiation helping to study many astrophysical objects and processes. TAIGA-ACT enables us to select gamma quanta from the total cosmic radiation flux and recover their primary parameters, such as energy and direction of arrival. The traditional method of processing the resulting images is an image parameterization - so-called the Hillas parameters method. At the present time Machine Learning methods, in particular Deep Learning methods have become actively used for IACT image processing.

This report presents the analysis of simulated Monte Carlo images by several Deep Learning methods for a single telescope (mono-mode) and multiple IACT telescopes (stereo-mode). The estimation of the quality of energy reconstruction was carried out and their energy spectra were analyzed using several types of neural networks. Using the developed methods the obtained results were also compared with the results obtained by traditional methods based on the Hillas parameters. The work was financially supported by the Russian Science Foundation, grant No. 22-21-00442.

Agreement to place

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