Contribution ID: **182** Type: **Sectional**

The use of CNN for image analysis from Cherenkov telescopes in the TAIGA experiment

Thursday 3 October 2019 09:15 (15 minutes)

The method of artificial neural networks is a modern powerful tool for solving various problems for which it is difficult to propose well-formalized solutions. These tasks are various aspects of image analysis.

This paper describes the use of convolutional neural networks (CNN) for the problems of classifying the type of primary particles and estimating their energy using images obtained from the Cherenkov telescope (IACT) in the TAIGA experiment. For the problem of classifying primary particles, it has been shown that the use of CNN made it possible to significantly improve the quality criterion for the correct classification of gammas compared to traditional methods using the Hillas parameters. For the problem of estimating the energy of primary gammas, the use of CNN made it possible to obtain good results for wide air showers, whose centers are located far enough from the telescope. In particular, it is important for the Cherenkov telescope in the TAIGA experiment, which uses a wide-angle camera when traditional methods do not work.

Neural networks were implemented using the PyTorch and TensorFlow libraries. Monte Carlo event sets obtained using the CORSIKA program were used to train CNN. CNN training was performed on both ordinary servers and servers equipped with Tesla P100 GPUs.

This work was supported by the RSF Grant No. 18-41-06003.

Primary author: Dr KRYUKOV, Alexander (SINP MSU)

Co-authors: ZHUROV, Dmitry (Irkutsk State University); POSTNIKOV, Evgeny (SINP MSU); POLYAKOV, Stanislav (SINP MSU)

Presenter: Dr KRYUKOV, Alexander (SINP MSU)

Session Classification: Machine Learning Algorithms and Big Data Analytics

Track Classification: Machine Learning Algorithms and Big Data Analytics