

Neural Information Technologies as Tool for the Physical Inference in High Energy Cosmic Ray Physics.

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One of the most important problems in physical inference from multivariate measurements is development of the reliable statistical procedures dealing with information from modern multipurpose experimental installations.

Nowadays, when multidimensionality of physical phenomena is well recognized and experimental techniques reach excellence to measure simultaneously many parameters with high precision, the necessity of adequate multivariate analysis methods is apparent.

To make the conclusions about investigated physical phenomenon more reliable and significant we have developed a unified theory of statistical inference, based on nonparametric models, in which various nonparametric approaches and Neural Networks are implemented and compared. In this context it is necessary to mention that we consider the Neural information technology not as a “black box,” but as an extension of conventional nonparametric technique of statistical inference.

The Analysis and Nonparametric Inference (ANI) program package is the software realization of our concept and appropriate tool for the physical inference in High Energy Cosmic Ray Astrophysics experiments. During last 10 years ANI package was updated and intensively used for comparisons of different nonparametric techniques and for data analysis of world biggest experiments, like PAMIR emulsion chamber collaboration, Wipple air Cherenkov telescope, KASCADE and MAKET NI surface installations for detecting the Extensive Air Showers.