

Reproducible and Automatized Analysis of Gamma-Ray Data Utilizing AI Methods

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26th of June 2025

For more than two decades, the MAGIC telescopes continuously accumulate significant amounts of data. However, the analysis of this data poses critical problems due to its volume exceeding existing data curation capacities. This criticality induces the demands for the utilization of AI methods to enhance and accelerate the analysis process. Thus, MAGIC utilizes random forests for an accelerated and robust reconstruction of the energy and direction of the measured particles.

Consequently, efficient analysis performed with the respective AI methods requires the development of a tool that ensures traceability as well as reproducibility. Therefore, we present the database-driven tool autoMAGIC, capable of coordinating the use of random forests for large-scale datasets. Based on the analysis specifications, autoMAGIC runs the respective tools for choosing suitable training data, training and testing the random forest, and storing the outputs for further processing over multi-year datasets. Furthermore, we present long-term lightcurves performed with autoMAGIC, demonstrating the use of autoMAGIC to acquire labor-intensive AI-based results efficiently.