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FACT-Tools: Streamed Real-Time Data Analysis

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The First G-APD Cherenkov telescope (FACT) is dedicated to monitor bright TeV blazars on the northern sky. The use of silicon photon detectors allows for a larger duty cycle, which results in a huge amount of allocated data (~800 GB/night). In order to satisfy its monitoring purpose, changes in the flux of the observed sources have to be registered without delay. This requires a data analysis chain that provides physical results at a rate that is comparable to the trigger rate of ~ 60Hz.

The recently developed data analysis software *FACT-Tools* aims to accomplish these requirements in real-time. It is implemented based on the data-flow framework *Streams*, which was developed at Dortmund's collaborative research center for resource-constrained data analysis (SFB 876). *Streams* provides an easy-to-use abstraction layer to design analysis processes by use of human readable XML files, aiming at modularity and guaranteed reproducibility. Multi-source processes (e.g. data from several telescopes) and multi-core processes (parallelization) are already included in *Streams*. In addition, a compatibility layer to Big Data software infrastructures (e.g. Hadoop, Apache Storm) is already supported. Therefore, *Streams* is an ideal framework for use in gamma-ray astronomy.

The *FACT-Tools* are an extension library that encapsulate analysis methods for Cherenkov telescopes. The collection of methods is ranging from RAW data handling and calibration up to image parameter extraction and Gamma-Hadron separation. The latter is performed by an online application of a random forest classifier, which in turn, allows for an adaptation in other tasks e.g. image cleaning or online estimation of the energy spectrum.

In this contribution we present the features of *FACT-Tools* and *Streams* alongside with their performance measured on the data from the FACT Cherenkov telescope.

Collaboration

FACT

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