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QualPipe: A Quality Control Pipeline for the CTAO Data Processing and Preservation System

The Cherenkov Telescope Array Observatory (CTAO) is a large-scale astrophysics project that will generate several petabytes of compressed data annually. Ensuring the quality of this vast data stream is critical for reliable scientific analyses.

QualPipe is the automated quality control pipeline integrated into the Data Processing and Preservation System (DPPS) of CTAO. It assesses data from the raw archival level (Data Level 0; DL0) to the science-ready stage (DL3), evaluating whether observation conditions were nominal or not, whether the hardware functioned correctly, and if the data meet the necessary standards for scientific analysis. The pipeline evaluates a wide range of monitoring variables against a set of customisable criteria defined in a configuration file, and produces quality reports for a set of telescopes that participate in an observation (subarray), as well as for its single array elements.

A key feature of QualPipe is its design: the core code remains entirely independent of the specific data quality criteria, which are defined externally through configuration files. This makes it highly adaptable to the evolving quality requirements, including early-stage commissioning of CTAO. The system includes a graphical user interface for the QualPipe users, who can inspect the current and the past quality assessment reports, and navigate through the numerous diagnostic plots for each array element.

This contribution will present the architecture of QualPipe, its role in CTAO's quality control workflow, and how it supports the efficient validation of observational data at scale.

Collaboration(s)

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