The RAPAS Data Processing and Archival System

Pier-Francesco Rocci, Renaud Savalle

We have developed a web-driven data reduction photometric pipeline and a Virtual Observatory compatible archive retrieval system for observations performed by the members of the RAPAS (Réseau Amateurs Professionnels pour les Alertes Scientifiques) program, a project which has be funded by the Gemini ProAm effort at Paris Observatory. RAPAS is a network of observers dedicated to the follow-up of transients, each equipped with a different telescopes and cameras, but using the same set of Gaia-compatible filters to facilitate comparison of results.
RAPAS Photometry Pipeline (RPP), is a Streamlit/FastAPI application for homogeneous reduction of RAPAS FITS image observations. After users have uploaded the image and set the analysis parameters, the pipeline performs header and WCS checks, optional Astrometry.net plate solving, and astrometry refinement through the stdpipe library. Then the pipeline automatically iterates through several steps: sources detection, aperture and PSF photometry with Astropy and Photutils, Gaia-based zero-point calibration, and catalog enrichment via GAIA, SIMBAD, SkyBoT, VSX, Milliquas, and Astro-Colibri. Results are managed through a Python stack using SQLAlchemy, and SQLite. All along the pipeline, general statistics, log messages, and plots provide the user with real-time information about the status of the pipeline.
The RAPAS Archive, implemented with the DaCHS backend, provides SIAP2 and TAP/ADQL services allowing to query the collected dataset. Those IVOA compliant services can be used by Aladin, TOPCAT, and our PADC ObsTAP portal which allows easy discovery and visualization.
We conclude by examining other ProAm (professional-amateur) collaborations and discussing how this framework and its methodologies could be adapted to facilitate the upload, processing, and archiving of their astronomical datasets. This approach would enable enhanced data mining opportunities for the broader astronomical community.