

Error: Macro TOC(None) failed

'NoneType' object has no attribute 'endswith'

SDQA WCS-Failure-Check Stage

Purpose

Independently verify the WCS solution obtained for a CCD image by matching extracted sources with astrometric-reference sources. Both types of sources are pre-filtered for specific properties that are appropriate for this task.

Inputs

From Policy

- minMatches (minimum required number of matches between extracted and reference sources)
- maxRmsRadDist (maximum allowed RMS radial distance between extracted and reference sources, in arcseconds)
- matchRadius (maximum allowed radius for matches between extracted sources and reference sources, in arcseconds)
- minStellarity (minimum stellarity for selection of extracted sources; dimensionless)
- nLocalBkgSigma (number of standard deviations above background required of peak pixel in source extraction, for selection of extracted sources; dimensionless)

From Clipboard

- ccdExposureId
- Set of extracted sources (sources extracted from the CCD image of interest)
- Set of astrometric-reference sources.

Outputs

The outputs are put on the clipboard as a persistable SDQA-rating vector with key = "astromVerifSdqaRatings", ultimately to be stored in the database. The vector has the following SDQA ratings:

- Number of matches (SDQA metric = "nAstromVerifMatches")
- RMS radial distance (SDQA metric = "astromVerifRmsRadDist")

Assumptions

1. Reference sources have been pre-filtered to have the following properties:
 1. Bright (range of magnitudes must cover a variety of backgrounds)
 2. Isolated
 3. High stellarity
 4. Non-confused

5. Very low proper motion
6. Non-diffraction-spike origin (in case of USNOB1 catalog; Dustin Lang has an improved version of this catalog, with Tycho-2 stars correctly merged back in, and stars more reliably marked as diffraction spikes or halos)
7. Optical band appropriate for image data
2. List of reference sources sorted by R.A. is preferable (but not required).
3. Reference sources are packaged in `lsst.afw.detection.SourceSet?` object.
4. List of extracted sources sorted by R.A. is preferable (but not required).
5. Extracted sources are packaged in `lsst.afw.detection.SourceSet?` object.

Attributes of Extracted Sources

- R.A. (degrees)
- Dec. (degrees)
- Peak pixel (D.N.; e.g., `SExtractor MU_MAX` divided by pixel area in arcseconds squared)
- Stellarity (dimensionless value between 0 and 1)
- Local background (D.N.)
- Local background standard deviation (D.N.; e.g., derivable from `SExtractor MU_THRESHOLD` et al.)
- Confusion flag (e.g., `SExtractor` bits 0 and 1)
- Saturated flag (e.g., `SExtractor` bit 2)
- Image-edge flag (e.g., `SExtractor` bit 3)
- Corruption flag (e.g., `SExtractor` bit 4)

Attributes of Reference Sources

- R.A. (degrees)
- Dec. (degrees)

Selection Criteria for Extracted Sources

- `Stellarity > minStellarity`
- `Flags = 0` (e.g., `SExtractor` bit flags; i.e., no confusion, saturation, edge effects, or corruption)
- `Peak > threshold` (= local background plus `nLocalBkgSigma` times local background standard deviation)

Processing Flow

1. Read `ccdExposureId` from clipboard.
2. Read extracted sources from clipboard.
3. Apply selection criteria to extracted sources.
4. Sort extracted sources by R.A.
5. Query database for reference sources.
6. Sort reference sources by R.A.
7. Match extracted sources with reference sources.
8. Compute radial root-mean-squared (RMS) radial distance of the matches, in arcseconds.
9. Put SDQA ratings on clipboard for database storage: `nAstromVerifMatches` and `astromVerifRmsRadDist`.
10. Raise exception if `nAstromVerifMatches < minMatches`.
11. Raise exception if `astromVerifRmsRadDist > maxRmsRadDist`.

Questions

1. What is the best flux or magnitude range to use when querying for the reference sources?
2. How will the database query for reference sources assure that they are isolated (e.g., have no neighboring sources within, say, 5 arcseconds)? One option is to obviate this query constraint by creating a sub-catalog containing only suitably isolated sources. Another more flexible option, which would result in a costlier database query, would be to store in each record the distance to the closest neighboring source.
3. Currently the source class does not store attributes for stellarity and peak-peak flux --how can this information be provided?
4. What source-extraction flags are currently available?
5. What information about *simulated* reference sources will be made available (cf. USNOB1-catalog attributes)?
6. Is the specified pre-filtering criteria for extracted and reference sources complete?