Palomar 200" LFC Reduction Cookbook

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1 Introduction

2 Requirements

- `numpy`
- `pyfits`
- `pyraf`
- `astropy`
- `scipy`
- `matplotlib`
- `astrometry.net` (see below)

pip install -r requirements.txt

3 Reduction

4 Astrometry & Alignment

1. `astrometry.py`
2. `fix_astrometry.py`
3. `combine.py`
4. `align_images.py`
5. (`imalign.pro`)

5 Calibration

asdf

A Installing Astrometry.net

Designate a directory for installation of Astrometry.net and its requirements. In the following example, the installation directory is `/home/bagley/Software`.

(Thanks to Michael Gordon (UMN-MIfA) for these installation instructions, which are also provided as a text file (`astro_setup.txt`)

A.1 CFITSIO

CFITSIO is a library of C and Fortran subroutines for reading and writing data files in FITS data format, available from NASA's High Energy Astrophysics Science Archive Research Center (HEASARC).

```
# mkdir ~/Software/cfitsio
# cd ~/Software/cfitsio
# wget ftp://heasarc.gsfc.nasa.gov/software/fitsio/c/cfitsio_latest.tar.gz
# tar xzvf cfitsio_latest.tar.gz
# cd cfitsio
# ./configure --prefix=/home/bagley/Software/cfitsio
```

```
# make
# make install
```

Add the following to your ~/.bashrc and source it:

```
# export PKG_CONFIG_PATH=/home/bagley/Software/cfitsio/lib/pkgconfig
```

Run the following commands, if they print something, you're good:

```
# pkg-config --cflags cfitsio
# pkg-config --libs cfitsio
```

A.2 Astrometry.net

If you are running Python in a Virtual Environment, make sure you are in your virtualenv before completing the next steps.

```
# mkdir ~/Software/astrometry
# cd ~/Software/astrometry
# wget http://astrometry.net/downloads/astrometry.net-0.46.tar.bz2
# tar xjvf astrometry.net-0.46.tar.bz2
# cd astrometry.net-0.46
# make
# make py
# make extra
# make install INSTALL_DIR=/home/bagley/Software/astrometry
```

Add the following to your ~/.bashrc and source it:

```
# export PATH="$PATH:/home/bagley/Software/astrometry/bin"
```

In your virtualenv, run astrometry.net as:

```
# solve-field --no-plot img.fits .....
```

A.3 Index Files

Astrometry.net requires index files, processed from an astrometric reference catalog such as USNO-B1 or 2MASS. Pre-cooked index files built from the 2MASS catalog are available here. Use the `wget` script to download the full catalog of index files, requiring about 10G of space. Alternatively, use the healpix png's to determine in which tiles your fields of interest reside and download only the relevant index files.

The software expects index files to be in `~/Software/astrometry/data`. If you don't have enough space there, symlimk the `data` directory to their actual location.

```
# cd ~/Software/astrometry
# rmdir data
# ln -s /other/thing/data data
```