LSST Documentation

Release

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Some notes on LSST/DESC analyses.

CHAPTER 1

Clusters

1.1 Generality

1.2 Cluster analisys in LSST

1.2.1 Get a cluster data

- Go online to

```
http://www2.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/en/search/?collection=CFHT&noexec=true#queryFormTab
```

- Select your target in `Spatial Constraints -> Target`, and then, select below using the following criteria:

```
Optical -> CFHT -> MegaPrime -> All -> Calibrated -> Image -> Object
```

- Click on the `Search` buttn. Make sure all exposure have an integration time of at least 200s (`Int Time -> >200`), and the calibration is 2 (`Cal. Lev`). `Mark` them all using the button at the top of the list, and click on `Download`.
- Click on `URLS list in a file`, download the list
- Go to your terminal, and launch `wget --content-disposition -i FILE_NAME` (see the webpage for details).

CHAPTER 2

Weak lensing

2.1 Generality

2.2 Weak lensing analysis in LSST

CHAPTER 3

General analysis workflow

This page gives an overview of the command/scripts that must be run to go from calibrated CFHT data to the cluster photometry estimate.

- Get the calibrated images from CADT: `wget`
- Reorganize the data: `ingestImages.py`
- Get the needed astrometry data: `get_astromerty.py`
- processCcd.py
- Coadition

CHAPTER 4

3C295

4.1 Get the data

- Go online to the CADC web page
- Select your target in `Spatial Constraints -> Target` (put 3C295), and then, select below using the following criteria:

```
Optical -> CFHT -> MegaPrime -> All -> Calibrated -> Image -> Object
```

- Click on the `Search` buttn. Make sure all exposure have an integration time of at least 200s (`Int Time -> >200`), and the calibration is 2 (`Cal. Lev`). `Mark` them all using the button at the top of the list, and click on `Download`.
- Click on `URLS list in a file`, download the list
- Go to your terminal, and launch `wget --content-disposition -i FILE_NAME` (see the webpage for details) in the directory you want to get the file you just downloaded.

```
cd WORKDIR/3C295
mkdir 00-CalibratedData
cd 00-CalibratedData
# the downloaded cadcUrlList.txt must be in the current directory
wget --content-disposition -i cadcUrlList.txt
```

- Depending on your connection, this could take a little wile (300-400MB / file, ~100 files)

4.2 Re-organize the data

We first need to re-organize the data to get a directory with a structure compatible with the LSST stack.

```
cd WORKDIR/3C295
mkdir input
# Declare an instrument mapper for the DM butler
echo 'lsst.obs.cfht.MegacamMapper' > input/_mapper
setup pipe_tasks
setup obs_cfht # -t chotard depending on your install
ingestImages.py input CalibratedData/*.fz --mode link
```

The –mode link will create links instead of copying file

4.3 Get the astrometry

A script available at CC-IN2P3 will help you get the needed astrometry files using as input the list of calibrated data downloaded in the first step (cadcUrlList.txt). It is for now stored under

```
/sps/lsst/dev/nchotard/scripts/get_astrometry.py
```

but will soon be uploaded on github. To run it, do:

```
cd WORKDIR/3c295
mkdir 01-AstrometryData
cd AstrometryData
get_astrometry WORKDIR/3C295/00-CalibratedData/cadcUrlList.txt
```

Here is in some details what the script does.

The coordinate of the cluster are (RA, DEC) = (212.8355, 52.20277) in degree. They also come from CADC. At the moment the most complete catalog available is based on SDSS DR9 and is available at IN2P3 in:

```
/sps/lsst/data/astrometry_net_data/sdss-dr9 (1440 files)
```

To get the specific files that you need for the cluster analysis, you will use

```
get-healpix -N8 212.8355 -- 52.20277  # "--" is optional in this case but mandatory for a negative de
```

Which will return

```
(RA, DEC) = (212.835, 52.2028) degrees
Healpix=157 in the XY scheme (bighp=2, x=3, y=5)
  healpix=100 in the RING scheme (ringnum=7, longind=16)
  healpix=167 in the NESTED scheme.
Healpix center is (212.14286, 48.141208) degrees
Healpix is bounded by RA=[205.714, 218.571], Dec=[41.8103, 54.3409] degrees.
Healpix scale is 26384.5 arcsec.
```

This output give you the file number that you need to get (Healpix=157). Since each

4.4 Create the list of visit for each filters

To do so, use the `build_visit_lists.py` this way

```
build_visit_lists.py -i ../input
```

which should output something like

```
INFO: 96 visists found
INFO: 5 filters found
 - i: 20 visits -> i.list
 - r: 21 visits -> r.list
 - u: 25 visits -> u.list
 - z: 13 visits -> z.list
 - g: 17 visits -> g.list
```

Run processCcd for all filter

```
run_processCdd.py -F g -m -a
```

CHAPTER 5

Mount sps or afs (or any other disks)

5.1 Install sshfs

Using apt-get, or yum, or dnf, you must install sshfs and fuse-sshfs.

5.2 Create directories

Create an empty directory in your home (or anywhere with the appropriate rights

```
mkdir ~/sps
```

Then you have to create a symbolic link in the root diretory pointing to the previoulsy create directory. You will then be able to use /sps or any other absolute path that you had at CC on you personnal computer.

```
cd /
ln -s /home/yourname/sps sps
```

5.3 Mount/unmount the disk

You are now ready to work on your computer with your own soft bu with a full access to the CC disks. To do so, mount /sps (or afs) the following way:

```
sshfs yourname@ccage.in2p3.fr:/sps ~/sps
```

Check that the disk is mounted

```
ls /sps
```

This should give you the same output as if you were at CC. To unmount the disk, use

```
fusermount -u ~/sps
```

The same `ls` should give you an empty output.

5.4 Create aliases

In your .bashrc (cshrc, or anything that you load while opening your terminal), added the following lines to mount/unmout the disks:

```
alias msps="sshfs yourname@ccage.in2p3.fr:/sps ~/sps"
alias usps="fusermount -u ~/sps"
```

CHAPTER 6

Packages install

6.1 Install an alternate version of meas_astrom

Clone the repository

```
git clone https://github.com/lsst/meas_astrom.git
```

Change branch if needed

```
cd meas_astrom
git checkout tickets/DM-6525
```

Install and set it up correctly

```
setup -k -r .
scons opt=3
eups declare -r . -t your_login_name
setup meas_astrom -t your_login_name
```

CHAPTER 7

Some examples

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

7.1 Creating a dummy Pandas dataframe

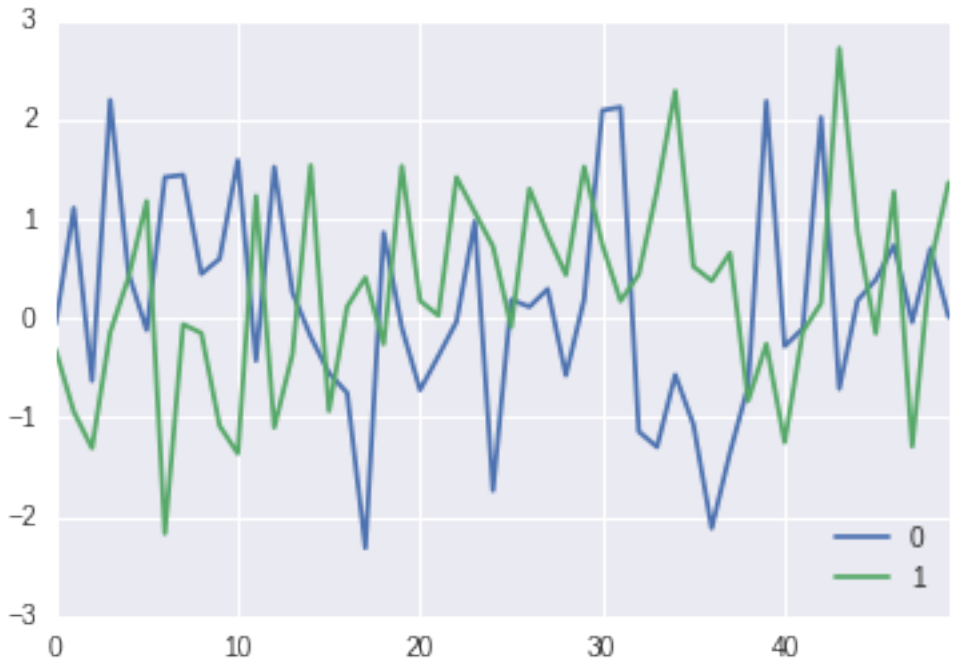
```
df = pd.DataFrame(np.random.randn(50,2))
```

7.2 How does the dataframe display render?

```
df.head()
```

7.3 What about plots?

```
df.plot();
```



$$c = \sqrt{a^2 + b^2}$$

(c = in $$

```
from IPython.display import display, Math, Latex
display(Math(r'F(k) = \int_{-\infty}^{\infty} f(x) e^{2\pi i k} dx'))
```

$$F(k) = \int_{-\infty}^{\infty} f(x) e^{2\pi i k} dx$$

CHAPTER 8

Links