ASTR 142 Project 2 – Hubble Ultra Deep Field

Data

The Hubble Ultra Deep Field (HUDF) data files include images in the I, V, and B filters of HST, found in https://archive.stsci.edu/prepds/udf/ (Beckwith et al., 2006). I used the photometric redshifts from the UVUDF catalog (Rafelski et al., 2015) and spectroscopic redshifts from the MUSE catalog (Inami et al., 2017).

Methods

I used an object-oriented based approach, creating a class for the plotter called `HUDF_Plotter` that controls the plotting and a helper class `HUDF_z_Catalog` that contains the redshift catalogs. `HUDF_Plotter` loads the HUDF data on instantiation and can add redshift catalog objects to be plotted on the main image and in distributions. There is also a method to cross-match catalogs. There are 4 plotting functions, including one to plot the main image, one to plot the histogram of redshift distributions, one to plot phot vs spec redshifts, and one to plot the multipanel image with inset views of square subregions. The inset views can be added via another function, given a pixel or sky coordinate and size.

Example plots are shown on next page.

Submission

The submitted tarfile will have a `data/` directory consisting of the HUDF fits files. The `plots/` directory contains png files of plots. The python file `proj2_runfile.py` is the main file containing the classes and a script to plot. The log file `debug.log` contains the logging information from the python file.

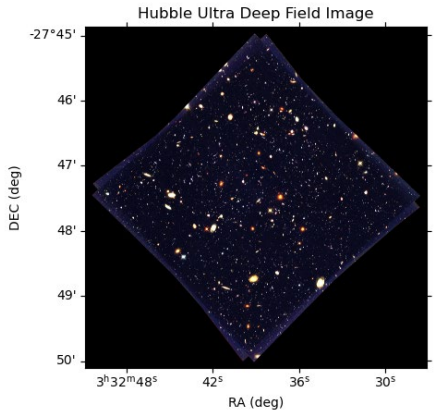
Citations

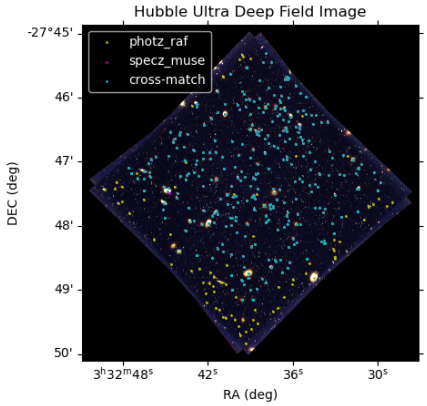
Beckwith, Steven V. W., Massimo Stiavelli, Anton M. Koekemoer, John A. R. Caldwell, Henry C. Ferguson, Richard Hook, Ray A. Lucas, et al. 2006. "The Hubble Ultra Deep Field." *The Astronomical Journal* 132 (November): 1729–55. https://doi.org/10.1086/507302.

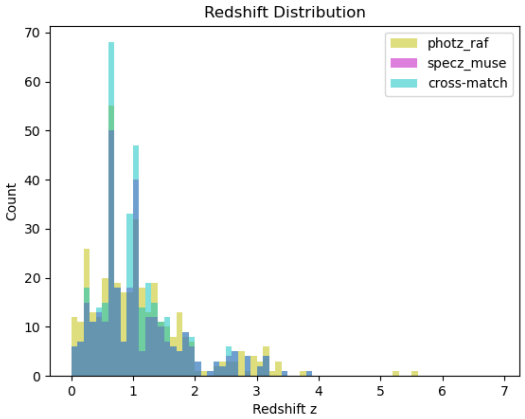
Inami, H., R. Bacon, J. Brinchmann, J. Richard, T. Contini, S. Conseil, S. Hamer, et al. 2017. "The MUSE Hubble Ultra Deep Field Survey. II. Spectroscopic Redshifts and Comparisons to Color Selections of High-Redshift Galaxies." *Astronomy and Astrophysics* 608 (December): A2. https://doi.org/10.1051/0004-6361/201731195.

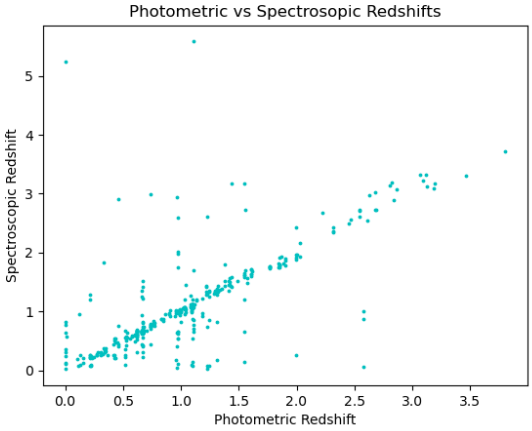
Rafelski, Marc, Harry I. Teplitz, Jonathan P. Gardner, Dan Coe, Nicholas A. Bond, Anton M. Koekemoer, Norman Grogin, et al. 2015. "UVUDF: Ultraviolet Through Near-Infrared Catalog and Photometric Redshifts of Galaxies in the Hubble Ultra Deep Field." *The Astronomical Journal* 150 (July): 31. https://doi.org/10.1088/0004-6256/150/1/31.

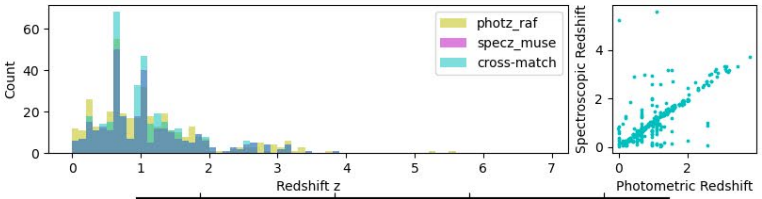
Plots

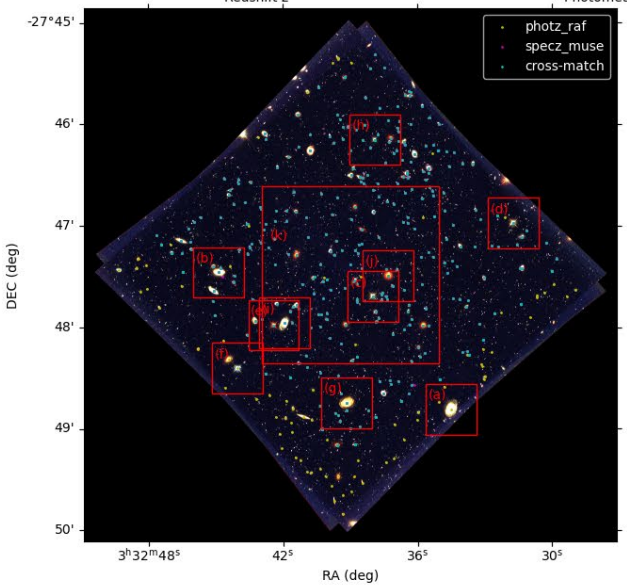

Hubble Ultra Deep Field Image
DEC (deg)
RA (deg)

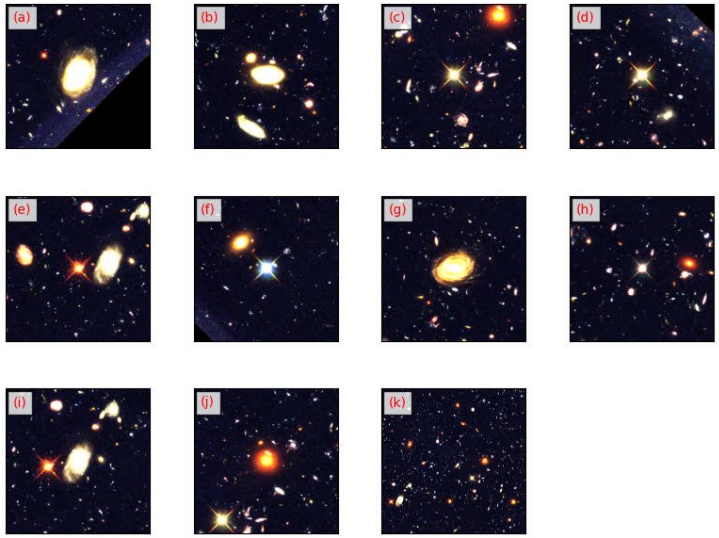

Hubble Ultra Deep Field Image
photz_raf
specz_muse
cross-match
DEC (deg)
RA (deg)


Redshift Distribution
photz_raf
specz_muse
cross-match
Count
Redshift z


Photometric vs Spectrosopic Redshifts
Spectroscopic Redshift
Photometric Redshift


photz_raf
specz_muse
cross-match
Count
Redshift z
Spectroscopic Redshift
Photometric Redshift


photz_raf
specz_muse
cross-match
DEC (deg)
RA (deg)
-27°45'
46'
47'
48'
49'
50'
3h32m48s
42s
36s
30s


(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)
(i)
(j)
(k)