**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

A diamond shaped image with stars

Description automatically generated with medium confidence A diagram of a star field

Description automatically generated with medium confidence

A graph of different colored lines

Description automatically generatedA diagram of a photometric graph

Description automatically generated

A collage of images of stars

Description automatically generated