STARFISH SCHOOL

A Virtual Bootcamp for Astronomy Graduate Students

SESSION 4 EXERCISES

Version 3.0

Exercise 1

Teams of 2-3 (Distribute Parts)

Using the SDSS Web Interface (http://skyserver.sdss.org/dr16/en/tools/search/sql.aspx), grab all objects between 29.75 < dec < 30 and 180.75 < RA < 181 (download them as CSV files) from the following tables:

1. the PhotoObj Table left joined with the SpecObj table (joined on objid and bestobjid respectively), grabbing the columns objid, ra, dec, u, g, r, i, z from PhotoObj, and z and class from SpecObj
2. the twomassxsc Table left joined with the PhotoObj table (joined on objid from both tables), grabbing the columns tmassxsc_ra, tmassxsc_dec, J_M_K20FE, H_M_K20FE, K_M_K20FE from tmassxsc, and objid, ra, dec, u, g, r, i, z from PhotoObj
3. the FIRST Table left joined with the PhotoObj table (joined on the objid from both tables) grabbing the columns ra, dec, and integr from FIRST, and objid, ra, dec, u, g, r, i, z from PhotoObj

Exercise 2

Query Gaia data with astroquery in a Jupyter Notebook

1. Install astroquery using pip (if you do not have it installed)
2. Select the first 100 000 stars in Gaia DR3 (use the gaiadr3.gaia_source table, see the schema via this link) with the following requirements:
    - parallax_over_error > 10 (so you select stars with parallax error less than 10%)
    - phot_g_mean_mag < 17 (so relative bright)
    - RA between 30 and 40
    - Dec between -50 and -40
3. Convert parallax to distance, and then to distance modulus.
4. Make an HR diagram (Colour-vs-Luminosity diagram) with M_G vs BP-RP

Exercise 3

- Take a Jupyter Notebook we give you (**`Get_SDSS_spectra.ipynb`**), and turn it into a production script.

Optional Exercise 1

1. Take the code from **`error_generating_script.py`**, follow the traceback, and make a minimal reproducible example

Exercise 3

- Open the **`session4_exercise.R`** in R studio
- Read the comments and work through the code, running the lines
- Try the different debugging tools, and fix the bugs

Optional Exercise 2

- Run through a debugging session to fix an issue in **`error_generating_script.py`**