

ISYA 2012

Exercise 8 - Multimission Archive at STScI

Summary

The **MAST** (Multimission Archive at STScI) database can be searched for object classes by relying on the target descriptor put in by the program Principal Investigator (PI). However, this information can be very crude and sometimes even meaningless. For that reason cross correlation of **MAST** data with positions from published object catalogs is a very powerful tool to discover data and use it in ways different from those anticipated by the PI for scientific research.

There are currently two major archive centers for **catalogs** and **object classification**, **VizieR** and **NED**. **MAST** has a web-based cross correlation services for both of them. The **VizieR** cross correlation relies on positions (**RA** and **DEC**) of the objects and assumes implicitly that the catalog positions refer to the Epoch 2000. The **NED** cross correlation is built along the lines of their advanced all sky search for objects by using redshifts and/or object classes.

The tasks astronomers want to see solved by archive centers such as **MAST** vary widely and we concentrate here on two basic examples that represent the most common interests -

1. Use a source catalog to find if there are any **HST** observations available in the archive.
2. Search the **MAST** archive for a particular object classification.

Activity 1

VizieR is a service run by the **CDS** (Centre de Données astronomiques de Strasbourg) and provides access to the most complete library of published astronomical catalogs and data tables that are available on line.

1. Goto **MAST** search interface for **VizieR** catalogs at

<http://archive.stsci.edu/vizier.php>

2. Enter catalog name - in this case the **Milky Way Globular Cluster Catalog from Harris (1997)** in the **VizieR** Catalog Search Form and click find catalog.
3. Once you select your catalog, you get to the next screen, where you can decide if you simply want to search the catalog (s) or do a cross correlation with **MAST** data. For this activity click on CC for cross correlation (assuming that you know the content of the selected catalog).
4. This brings you to the next screen: selecting the **MAST** missions and search criteria. The page shows the catalog search form with all available **MAST** missions to cross correlate and their default search radii. The cross correlation uses a cone search around the catalog position (**RA**, **DEC**). In this activity, you will check how many of the cataloged globular clusters have **WFPC2** data which are combined images from the Wide Field Planetary Camera 2 of **HST**. Set the maximum records field to 100 which means that for each catalog entry a maximum of 100 **WFPC2** images will be returned. You can choose between different formats for the search result such as an **HTML** table, an Excel spreadsheet, comma separated values (**CSV**), or a **VO table**. Select here the **WFPC2** and click on **Search** to carry our cross correlations.
5. This brings you to the next screen - the result of the cross correlation of the **VizieR** globular cluster catalog **VI/202** and the **MAST WFPC2** images. The first table shows the catalog entry with all columns, the second table the results from the cone search in the **WFPC2** images and the associated metadata. You can download the fits preview file by clicking on the name. The data for the **WFPC2** is available online and can thus be retrieved without delay.
6. If you had chosen any other **HST** entry such as **ACS** for example, you would be able to see the preview by clicking on the dataset name and retrieve the data through **DADS**. The pipeline processed data is generated on-the-fly and depending on the volume, requests on average take about one hour.

Activity 2

In this activity you will learn how to search the **MAST** archive for a particular object class using **NED** (NASA's Extragalactic Database). The **MAST** search

form for cross correlation with NED shows the same capabilities as NED's Advanced All Sky search interface for object types.

1. Go to **MAST NED** cross correlation interface at <http://archive.stsci.edu/ned.php>
2. For this activity, we are interested in high redshift, $z > 6$, quasars that have **ACS** observations. On the search form use the redshift pull-down menu to select larger than and enter 6.0 in the first numeric field. Further down select QSO's from the list of extragalactic objects to be included. At the bottom of the form you find a list of all **MAST** missions to cross correlate with (similar to the **Vizier** cross correlation). Select now ACS and hit the Search **NED** and cross correlate button to execute the **NED** search and a subsequent cone search of **ACS** data.
3. The query returns 10 high redshift quasars that have one or more **ACS** observations taken within a radius of 3 arcmin. Clicking on See results from **NED** brings up a new screen with **NED's** summary of its catalog metadata on all 10 quasars. Clicking on a dataset name on the results screen gives access to a preview image whenever available.

Loading the preview into Aladin gives additional functionality such as overlaying catalogs (e.g. NED, Simbad), loading additional images from other archive centers or from disk, overplotting Vizier catalogs and image manipulation which beyond this exercise.

Data download proceeds the same way as outlined in the **activity 1**.