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Astrobrowse: a Web Agent for Querying Astronomical Databases

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Abstract. Astrobrowse is a user agent which significantly streamlines the process of gathering astronomical data on the web. With it, a user can query thousands of resources without having to search through old bookmark lists, deal with out-of-date URLs, or spend time figuring out how to use each resource's unique input form. Given a user's selection of web-based astronomical databases and an object name or coordinates, Astrobrowse will explode queries to all selected databases and collect the results. Since the introduction of the prototype at ADASS VII (McGlynn & White 1998), many changes have been made to the service, from adding JavaScript form validation, to the adoption of GLU (Fernique, Ochsenbein & Wenger 1998) as the mechanism for keeping the resource URLs current.

This software is freely available to anyone wishing to become an Astrobrowse node.

1. Need for Astrobrowse

With the ability to query astronomical databases and catalogs online becoming more and more the norm, it has become daunting to try to keep track of all these queryable services. A bookmark list with all these forms and data centers can become unmanageable. It is also likely to become out of date, since web addresses are frequently changing. In addition, most of these query forms have different formats, requiring the user to learn how to use a different form at each new query site. Often the user must enter positional data in particular formats or epochs: one site may ask for decimal right ascension and declination, while another requires sexagesimal (hh mm ss) coordinates.

To address these problems, the Astrobrowse effort was developed with close cooperation by many institutions. Some of the involved groups are: HEASARC, ADF, STScI, CDS, SAO, IPAC, LEDAS, and CADC. HEASARC[3], STScI[4], and

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[3]`http://heasarc.gsfc.nasa.gov/astrobrowse/`

[4]`http://faxafloi.stsci.edu:4547/starcast/about.html`

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CDS[5] each have their own versions of the Astrobrowse software, and SAO and LEDAS are running the HEASARC version.

2. What Astrobrowse Provides

We have already compiled a large list of position-searchable databases on the web. When a new one is suggested, a web form is filled out by the Astrobrowse administrator or by the person suggesting the new site, and the Astrobrowse software converts this to the correct format.

URLs are kept current through the CDS's GLU server software[6]. This software propagates changes in the database descriptions to all Astrobrowse GLU network members, enabling Astrobrowse to use the latest available URLs when querying databases.

Astrobrowse takes care of converting the user's object name or position into the format and epoch required by each remote query service. Considering the amount of time expended to find, load, and fill out a large number of suitable query forms, the time savings for the user become significant, since with Astrobrowse the user only fills out one form to retrieve the same amount of information.

3. How to use HEASARC's Astrobrowse

Using the HEASARC version of Astrobrowse, the user can choose to query from the menus of resources provided, or to create a custom resource list using a search tool. The search tool allows the user to search for only X-ray resources, for example, or only resources serving images, or ones holding data from a particular satelliteions

Once a list of resources is displayed, the user chooses which ones to search via checkboxes, and enters either an object name or coordinates. Astrobrowse then formulates a query to each data service: looking up the object name (if given) via SIMBAD or NED, converting the object coordinates to the format specified by the remote service, and providing additional form input needed by the remote service.

Each query is sent by Astrobrowse in parallel, and as the results are received by the remote services, each is saved on the server machine. The user is shown a framed results page, with an index to the results shown in the left frame, and each individual result shown in the right frame as the user clicks through the index. The user can switch back and forth easily between results, or pop up new browser windows for side-by-side comparisons.

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[5] `http://simbad.u-strasbg.fr/glu/cgi-bin/astroglu-m2.pl`

[6] `http://simbad.u-strasbg.fr/glu/glu.html`

4. Recent changes to Astrobrowse

4.1. GLU Maintains the Resource Database

The resource description database used by Astrobrowse is maintained by the CDS's GLU network software. This software allows each network member to change the entries owned by them as needed, and GLU distributes the change to all other members. The system is not hierarchical, so if one member institution experiences network problems, no one else is affected. Currently there are eight members in the Astrobrowse GLU network. In addition to the URL and form data needed for the query, the GLU resource description entries carry metadata specifying additional URLs (such as help documents), email addresses of maintainers, server location, etc. The software is freely available from CDS.

4.2. Cookies Store User Choices

HEASARC Astrobrowse sets a cookie which stores the names of the catalogs the user queried last, so if the researcher wants to do a search for data on more than one object, he or she doesn't have to remember which catalogs were selected for the previous source. The cookie expires after one month.

4.3. JavaScript Form Validation

JavaScript functions have been added to the keyword search form and the catalog selection form in HEASARC Astrobrowse. These functions check to make sure the user has specified necessary input in the correct format before submitting a request to the server. Since the form validation is done on the client side, this saves the user time – the user doesn't have to wait for the server to receive the information, decide that there's a problem, and return an error message. This arrangement also reduces the load on the server machine, since only valid requests should be sent to the server. These JavaScript additions have been designed to be cross-browser compatible, and the software will still work with server-side form validation in case users run their browsers with JavaScript disabled.

5. The Future of Astrobrowse

We are investigating allowing non-positional queries in Astrobrowse; already some databases are queryable by object name.

More resources are continually being added to those queryable through Astrobrowse, there are currently more than fourteen hundred.

We have made the HEASARC Astrobrowse software available to download from its web site. We encourage other institutions to install the software and provide the Astrobrowse service.

We have recently been granted funding for a design study on ISAIA (Interoperable Systems for Archival Information Access), which will build on the Astrobrowse concept. ISAIA will have the ability to search on many different metadata parameters, not just position. It will integrate the results received from remote providers into unified tables of data – making interpretation of the data much faster and easier.

References

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