Astronomical Data Analysis Software and Systems IX
ASP Conference Series, Vol. 216, 2000
N. Manset, C. Veillet, and D. Crabtree, eds.

The Role of the CDS Information Hub in the Cross-identification of Large Surveys

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Abstract. The services developed by the Centre de Données astronomiques de Strasbourg (CDS) will play a major role in the cross-identification of objects from large surveys. SIMBAD provides the identification of objects published in the literature, or from reference catalogues; the VizieR catalogue browser can be used to browse through the survey result catalogues, and to compare them to other catalogues and published tables, and the ALADIN sky atlas allows one to overlay survey catalogues on images of the sky, together with SIMBAD, NED, and catalogues and published tables from VizieR. Several aspects of the recent CDS development pave the way to this usage of the CDS services: the inclusion of TYCHO in SIMBAD, the implementation of the public DENIS and 2MASS catalogues in VizieR, and the release of the ALADIN Java interactive tool. The ESO/CDS data mining project, and the AstroGLU discovery tool, aim at providing advanced tools for cross-identification and access to distributed, heterogeneous information. The development of generic tools, such as the CDS GLU system (Générateur de Liens Uniformes), and the definition of standards for information exchange, in cooperation in particular with the archive providers and the journals, and in the frame of project such as ISAIA or DYNACORE, are also keys to provide 'clever' and 'transparent' links between all the information needed for the scientific interpretation of observations.

1. A User Scenario.

Suppose that we have sources from a very large catalog (for example the DENIS infrared survey). VizieR allows very fast access by coordinates to this catalog either directly from its http interface or from the Aladin Interactive Sky Atlas. This is also the case for the USNO, GSC and 2MASS catalogs (Derrière et al. 2000, and references therein). Aladin (Fernique et al. 2000 and references therein) is an access tool to reference images of the sky - digitized Schmidt surveys from DSS1, MAMA/CAI and recently also from DSS2 - and to various CDS (and others) databases and archives. Figure 1 show a DSS1 image of the 30 Doradus region in the LMC.

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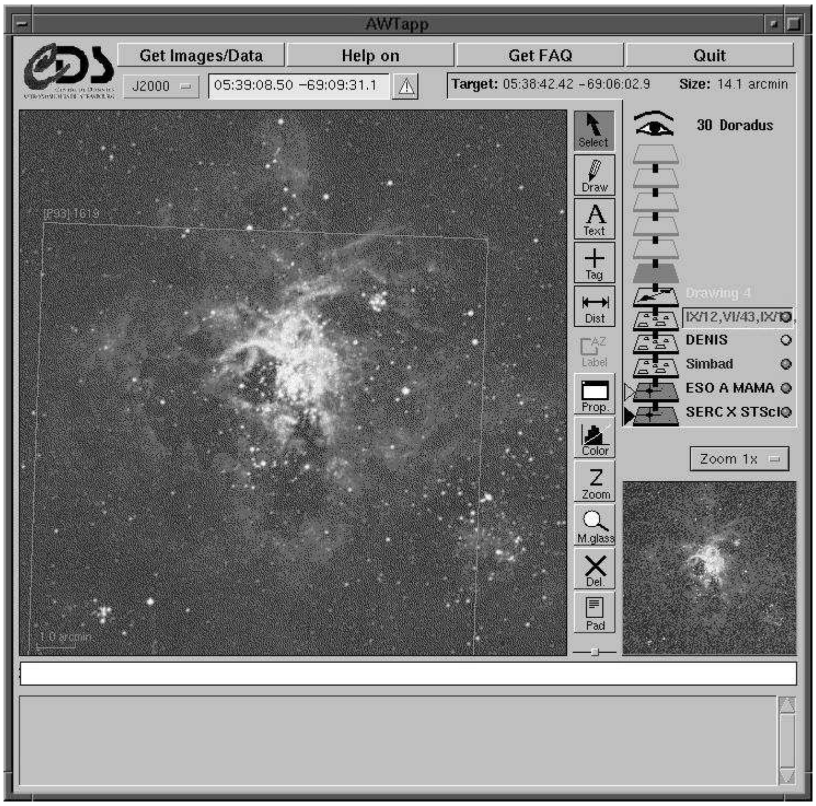

Figure 1. DSS1 image of the 30 Doradus Nebula within Aladin.

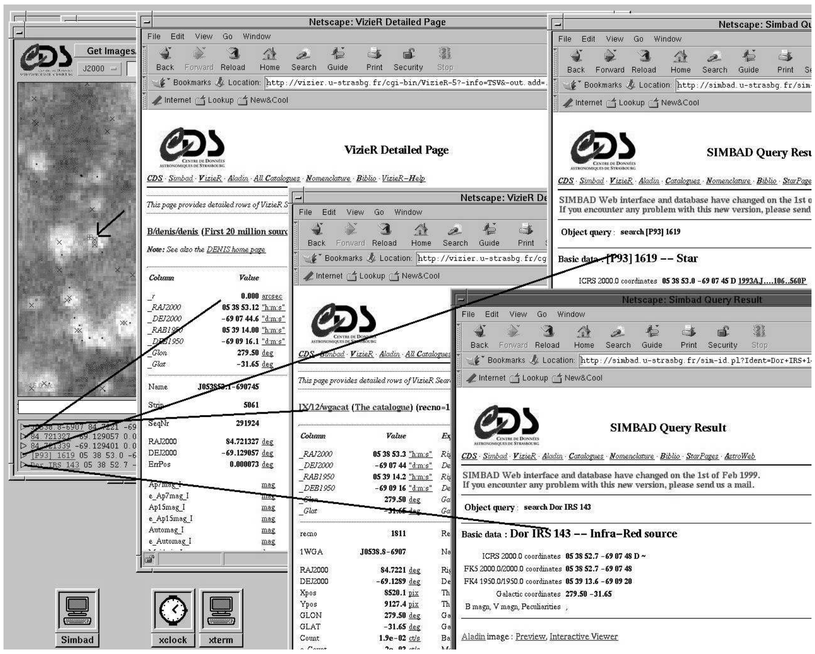

Figure 2. Overlays and database content.

In a second step (Figure 2) X-ray sources (WGACAT catalog) from VizieR and SIMBAD objects have been overlayed on the image in addition to DENIS sources, as tentative cross-identifications for them. From the overlays we can produce a small clickable list, and from there go to the content of VizieR and SIMBAD for these objects. SIMBAD provides coordinates, magnitudes, spectral type, bibliographical references with links to the ADS services. Links to IUE spectra and HEASARC measurements are also available. VizieR provides data from more than 2600 astronomical catalogs, tables of journals, and observatory archives logs with links to the archives (IUE, HST for example).

In our example, a DENIS source has been associated visually by position to two Simbad objects: an O star ([P93] 1619) and an infrared source (Dor IRS 143). In addition an Xray source is very close (marked area on the image in Figure 2). It is likely that the DENIS source and the two SIMBAD objects are the same star. But the Xray source had been previously cross-identified with a other F star (HD 269929, seen from the WGACAT record) with an inaccurate position. The assessment of the proper cross-identification really requires a study of all the available information about the objects.

This example illustrates how the CDS on line services can help to build cross-identification strategies on individual cases, or give information to solve problems occurring in cross-identification processes.

Of course, cross-identification of long lists of objects or of whole catalogs requires to process large quantities of data and cannot be done interactively. CDS also provides client routines for automatic access to Simbad, catalogs in Vizier, and images from the Aladin server.

2. Other Discovery Tools for Cross-identification at CDS

Astroglu, provides a list of URL of databases containing information on astronomical objects. It is based on a dictionary of remote services maintained in the framework of the GLU system. A customization of this service for helping observers on optical telescopes (DYNAGLU) is being developed in the frame of the EC project DYNACORE.

In order to find its way among the catalog jungle for positional cross-correlation, it is useful to select among the catalogs for example by Column Content or Wavelength coverage. This is the aim of the ESO/CDS data mining tool, which is an ESO/CDS collaboration (Ortiz et al. 1999).

An XML formatting of tabular data is being discussed in collaboration with other partners (Ochsenbein et al. 2000). XML output of VizieR has been implemented to facilitate data exchange.

3. Other Coming Tools

The next step in providing cross-identification tools will be to provide links between SIMBAD and VizieR. This will allow the users to retrieve all the measurements in various catalogs for objects in the SIMBAD database. These links will be based on the availability of cross-identifications in SIMBAD, in the catalogs, and on position.

A database for very large catalogs is currently being studied at CDS. The goal is to manage several survey catalogs in the same commercial object oriented database (Objectivity), and to provide fast access for sampling by the main parameters, using multicriteria indexation.

4. How to Access These Services and More Information

All these services and related documentation are accessible at the address: `http://cdsweb.u-strasbg.fr`. More about recent developments of the CDS services can be found in the paper by Genova et al. (2000) in these proceedings.

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