Astronomical Data Analysis Software and Systems IV
ASP Conference Series, Vol. 77, 1995
R. A. Shaw, H. E. Payne, and J. J. E. Hayes, eds.

Exploring Interactive Archive Data Presentation at the COSSC

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Abstract. As the *Compton* Observatory archive grows in size and complexity, it is increasingly difficult to present the archived data in a way which allows users to get a good grasp of what the archive holds. We are now using hypertext, presented through the World Wide Web, in an attempt to alleviate this problem. We are working on giving our users methods for searching the holdings of the archive.

Hypertext form pages have been created for two instruments: BATSE and EGRET. Each page lets users define the parameters of a search. The results of the user defined search are returned both graphically and as text hyperlinked to the relevant data in the archive.

As our understanding of the requirements grows, we hope to present views of the data in the archive which are better tailored to the ways in which our users look at those data.

1. Introduction

The exploration of hypertextual data presentation at the COSSC[1] was facilitated by the creation of tables of data, in electronic form, which describe the BATSE and EGRET datasets available in the *Compton* Observatory archive.

Bursts recorded by the BATSE instrument are characterized by a set of parameters stored in a catalog. We allow users to specify parameter values in a hypertext form. The values are then checked against the catalog, and qualifying bursts are selected. The selected bursts are plotted on an Aitoff projection. Hypertext links are provided, both to the data in the archive and to pages which show graphs of the bursts and burst specific information.

Data collected by the EGRET instrument can be selected from an Aitoff projection of the EGRET sources. In hypertext browsers supporting imagemap selection, the user can click on the skymap and links to pertinent data for that region of the sky are returned.

[1] http://enemy.gsfc.nasa.gov/

2. BATSE

The BATSE hypertext search page[2] is based on the BATSE 2nd Burst Catalog, created by the BATSE instrument team. The information in the set of seven tables which make up the catalog provides a wide variety of characteristics parameterizing the detected gamma ray bursts. The tables include, among other things, data on:

duration The duration on the burst at 50% and 90% burst fluence levels.

Cmax/Cmin The peak count rate in units of the threshold count rate on 64 ms, 256 ms and 1024 ms time scales.

fluence The fluence of bursts in channels one through 4 in units of ergs cm^{-2}.

location The galactic longitude and latitude of the bursts.

The BATSE page allows a user to select which parameters will be used for comparisons. The parameters which are of interest can then be characterized with $>$ and $<$ combinations and values. Once active parameters and their values are selected, the hypertext form is submitted, and processed by a Perl script.

The Perl script searches the various tables for matching bursts, graphs those bursts on an Aitoff projection of the sky, and lists the data for which the user was searching as hyperlinks to the data files in the anonymous ftp area of the *Compton Observatory* archive. A C program plots the bursts on an Aitoff projection in a GIF file for inclusion on the HTML page. Coordinate transformations are performed by FORTRAN functions.

3. EGRET

Two resources gave us the ability to put together a hypertext page for searching EGRET data[3]: a skymap of the objects that EGRET has observed, and a set of tables containing some of the interesting parameters which characterize the EGRET observations. The EGRET search opens with an Aitoff projection of the sky. The skymap is an imagemap which is part of an HTML form; clicking on the skymap returns (x, y) coordinates. Below the map on the page are buttons allowing the selection of objects of interest (pulsars, quasars, or unidentified sources). The width of the sky search is also selectable with a fill-in-the-blank area of the form.

After clicking on the imagemap, the (x, y) coordinates, objects of interest, and the width of the search are sent to a Perl script which converts the coordinates to galactic longitude and latitude, and then checks through the EGRET tables for the specified object types, within the specified search radius. The results are returned on an Aitoff projection of the sky, displaying the selected objects. Along with the graph, the information selected from the EGRET data

[2] http://enemy.gsfc.nasa.gov/cossc/batse/burstcatalog/batseform.html

[3] http://enemy.gsfc.nasa.gov/cossc/egret/egretcatalog/egretform.html

tables is displayed as text, with hyperlinks to the data in the *Compton* Observatory archive.

An alternative way of using the EGRET form is to click on the Aitoff projection without selecting any objects of interest. When this is done, the object nearest the selected location is returned, with the data about the selected object presented in the same manner as when multiple objects are selected.

4. Some Words on the Software

The software driving the BATSE and EGRET hypertext search forms is built in several languages, with the intent of reusing as many of the software modules as possible. We also sought to perform each of the required functions in the language most appropriate to the task.

The main program for each form is written the scripting language Perl. We have found that Perl is excellent for interfacing with hypertext forms and for rapidly creating complex software. C was used to create the GIF images which are inlined in the hypertext pages. FORTRAN is used for routines doing coordinate transformations. Each of the C and FORTRAN routines is completely modular and works as a command line routine. Each of the routines was used in the development of both the EGRET and BATSE forms.

5. Conclusions

The hypertext forms for searching the EGRET and BATSE databases provide added value for users of the archival data of the *Compton* Observatory by allowing users a better method for directing a search through the data. As our store of data continues to grow, we will continue to explore new and novel ways in which hypertext allows the data in the COSSC archive to be presented and selected.