

SOFTWARE APPROACH FOR PARAMETRIZATION OF FITS DATA

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Abstract. Using ordinary software tools including tiff-fits converting, astrophysics users need editing or repeating table information, named fits-header. In this paper the approach and software realization of the usable software tool for the astrophysics purposes are described.

1. INTRODUCTION

Some of the tasks of the project Astrophysics directly linked to the need for adding or editing a text-tabular astrophysics data, called fits-header. One such case is the conversion of astronomical images scanned as TIFF graphics file format to that adopted in specialized astrophysics FITS (2010) file format. The content of the fits-header is essential for proper interpretation of the contained graphics and also has useful information about the observatory, made graphically documented observation, astronomical instruments, which is made, the observation date and duration of monitoring and others.

There are software solutions that allow editing of the fits-header directly entered by the user: name for the key, value and comment. Experience of using these software tools shows that the introduction of direct indication of the key values and is not sufficiently effective. Alphanumeric identification key of the sense defined constant, or speaking a second domain name and be spelled exactly the use of certain symbols and format. Similarly, the value of the corresponded value is of a particular type has a physical dimension, range of values and in some cases default.

During the research project "Astrophysics" and being able to create new software tools and processes for the conversion of tabular and graphical content astrophysics widely used FITS file format, here a programming model with which to implement menu oriented interactive subsystem for adding and editing of fits-header data and parameterized views of partial images is offered.

2. PROGRAMMING MODEL OF THE PARAMETERIZED FITS-HEADER DATA

Fig. 1 displays the development of the project Astrominformatics software application, "TIFF to FITS converter".

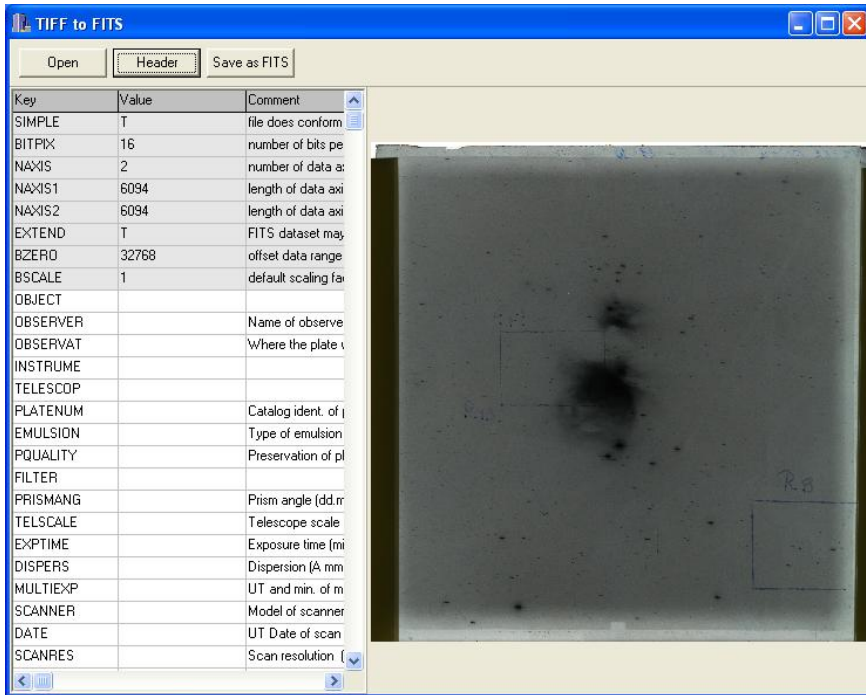


Figure 1. Astronomical image with fits-header table.

On the left in Fig. 1 tabular fits-header data specific to the output TIFF file of the astronomical image and automatically filled in, and some other keys, values that need to be manually entered are shown. For large groups of output TIFF files manually input fits-header data have some repetition, therefore parametrization by creating templates is suggested.

Fig. 2 presents schematically the essence and logical links used for description of complex patterns of fits-header data.

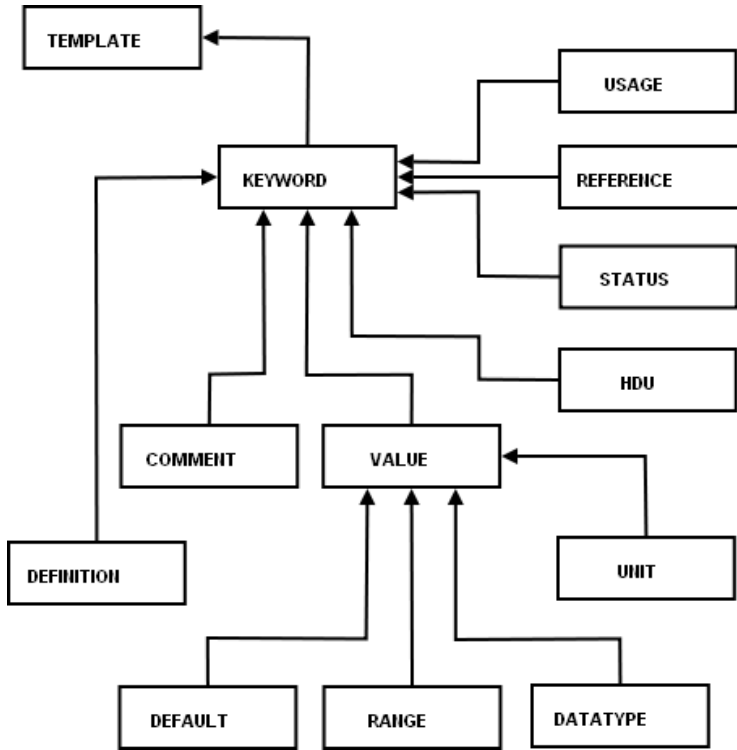


Figure 2. Logical scheme fits-header template.

A brief explanation of the entities of the logical scheme in Fig. 2 is presented in Table 1.

Table 1:

Entity	Description
TEMPLATE	Defined list of templates available to users by their names
KEYWORD	Alphanumeric identification key
USAGE	Scope of the key - standard, or conventional
REFERENCE	Reference to the document governing the use of key
STATUS	Mandatory or reserved for possible use
HDU	Specify the data block to which can be used
COMMENT	User comments
DEFINITION	Substantive definition of the key governing document
VALUE	Key value
UNIT	Units of value
DATATYPE	Type of value
RANGE	Range of values for that key
DEFAULT	Default value, if any

3. PROGRAMMING MODEL FOR USER-DEFINED VIEWS

The study of application software custom designed for astroinformatics shows the need to build tools for astroimages navigation in order to detect the image details. Most of the examples mentioned have similar software features zoom and select the current center of the image and applying different methods of filtering and visual correction. In practice, if a specialized user is interested in details of the image, which referred to a specific FITS file, this file may be accessed through a set of parameters. A similar example is a Linux version of the test program, developed for the needs of project Astroinformatics and shown in Fig. 3. Here a relatively simple but effective software tool helps the user to access a total picture of the region and to receive in a new window image in the partial set zoom and filters applied.

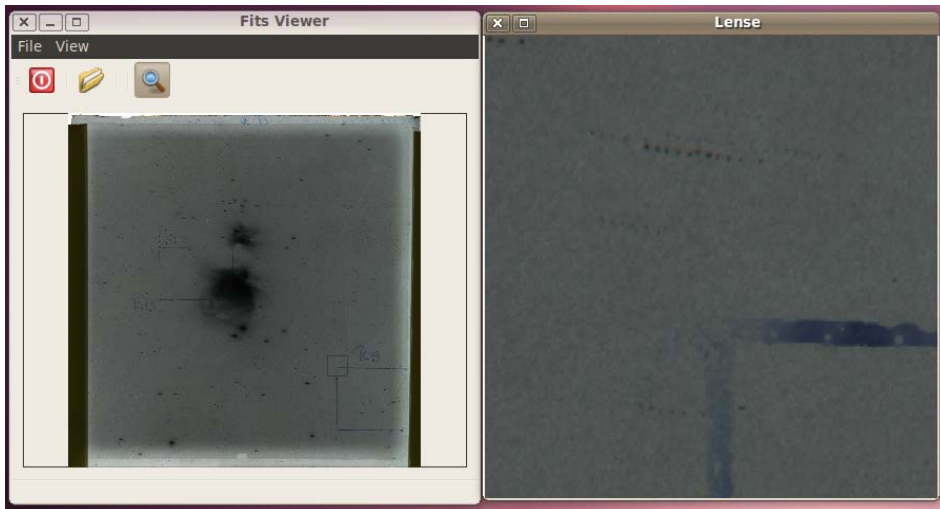


Figure 3. Astroimage defined view.

Is it possible an once defined view to be parameterized in such a way that at the next entry in the program to be restored and why not the user to get a list of all defined views to that image?

This opportunity provides a flexible structure of the FITS file format, namely the creation of an extension of type ASCII table. Each user is described in view of information structure, preservation and access program. The data structure designed to maintain user views at FITS astro-image is presented in Fig. 4.

Software and technological approach for storing user parameterized views is likely to be as tabular relational scheme or XML structure (Thomas et al., 2001). FITS an interesting solution based on SQL (Structured Query language) was submitted by Amy Shelton (FITS Query Language, 2008).

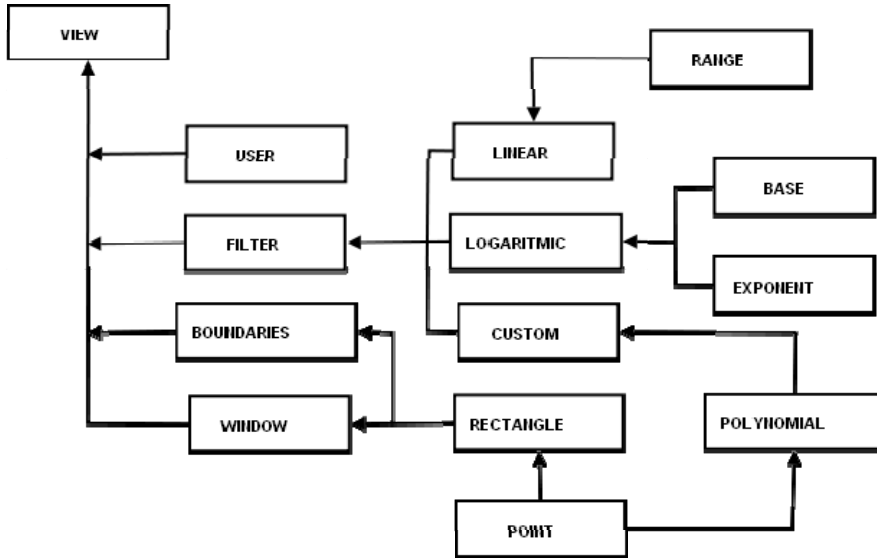


Figure 4. Parameterization of user views.

In Fig. 4 naming views consist of user data, data on the attached filter which could be linear, logarithmic, or arbitrarily defined. In the latter case the filter is presented as functional interpolation curve. Geometric positioning and screen size of the view defined by boundaries on a rectangular area in the main image window and the borders of the resulting view.

4. CONCLUSIONS

Models of software programming tool to serve astrophysics users based on pilot testing of software within the project Astrophysics is provided. Final development of a similar type of software would increase efficiency of the work of specialists dealing with converting graphics file formats to specialized for astrophysics FITS file format. Also, beyond the project, the proposed publication of software so far in "custom parameterized views" is in the service of numerous professionals and amateur astronomers, as well as astrophysics specialists. In the latter case a further development of the idea of parameterized FITS tabular data could grow to the construction and maintenance of WEB-based database with possibilities for centralized updating of fits-header versions and increase mobility in the definition and use of user defined views FITS .

Acknowledgements

The present research has been conducted in the frames of Astrophysics project supported by the National Science Fund at Bulgarian Ministry of Education and Sciences (grant DO-02-275/2008).

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