StarGazer – Star-chart Producing Internet Service

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Abstract

StarGazer is a web-based Internet service for star-chart producing. At present it works with GSC-ACT, SAO and YBS catalogs. It is capable of working with every stellar catalog since it uses standard database server (PostgreSQL) as a search engine. This determines its independence from the specific catalog format. The first public release of the system is available at `http://www.astro.bas.bg/stargazer/`.

Introduction

Finding star-charts are widely used in the observational astronomy for the purpose of identifying the object to be observed. There are various kinds of software doing this but they require not only a set of CDs with the catalogs but the installation of the respective software in order to be able to get the star-chart. Moreover – this software is operating system dependent and can work with limited number of catalogs.

The main idea of the StarGazer project was to create a software which is platform independent, easy to use and widely available. This led to the concept of an Internet service with a web-based interface. That is why StarGazer is compatible with every operating system (Linux, Solaris, Windows etc.) on any platform (Sparc, Intel, Alpha etc.). The only requirement is a web browser and Internet connection (Figure 1).

1 Features of StarGazer

Currently StarGazer uses three catalogs: GSC-ACT, SAO and YBS. GSC-ACT catalog is the main one because of its over 19,000,000 entries up to magnitude 16^m.

The star maps are generated in Adobe PostScript (PS) and Adobe Portable Document Format (PDF). The native output of StarGazer is PS. PDFs are generated from StarGazer's output by GhostScript on the server side. Using PS or PDF output gives high print quality of the charts.

Storing catalogs in a database server gives some significant benefits: first, a correctly tuned database is searched extremely fast, and second, it makes StarGazer catalog format independent (the catalog just has to be dumped in the database and to be described in the corresponding configuration tables).

Figure 1: The user interface of StarGazer, using Mozilla web browser.

The free relational database server – PostgreSQL is used as a search engine. The interface to the database and StarGazer itself are written completely in Perl.

Currently StarGazer is able to:

- Draw a map with a specified Stellar catalog, center of the field, field of view and maximum magnitude using Gnomonic projection.
- Label objects on the map with their catalog IDs or their magnitude.
- Label objects brighter than a specified magnitude or leave them unlabeled.
- Generate maps for printing on different paper formats (A4, A5, Letter and etc.).
- Generate maps in Adobe PostScript and PDF format.

As it is in early stage of development it still has some significant limitations which will be removed in the upcoming releases:

- As for now StarGazer can not draw the Deep sky objects.

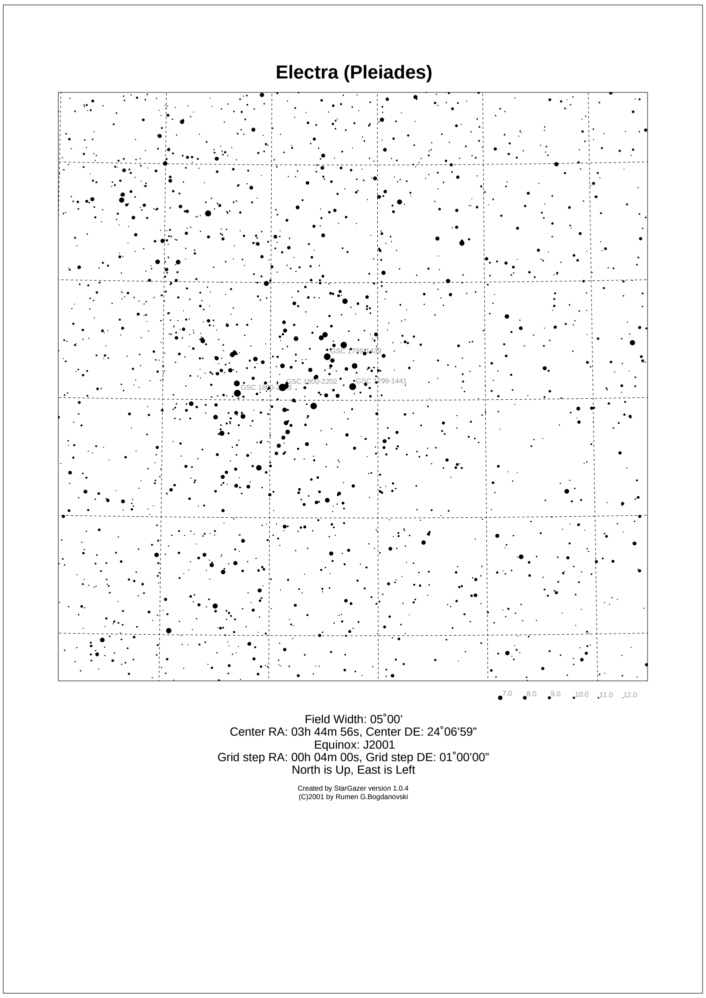

Figure 2: Map of Pleiades - centered on Electra, prepared for A4 paper printing.

- Currently the Right Ascension and Declination of the center of the region need to be known to get a map of it.

- The map grid labels are not very good implemented.

- There are no cross-references between the different catalogs.

Inspite of the current limitations StarGazer is a useful tool. On Figure 2 and Figure 3 are shown two charts, of Pleiades and the North Pole zone respectively, generated by StarGazer.

2 Using StarGazer

StarGazer is available online at `http://www.astro.bas.bg/stargazer/`. In order to get the desired map the specific parameters should be filled in the

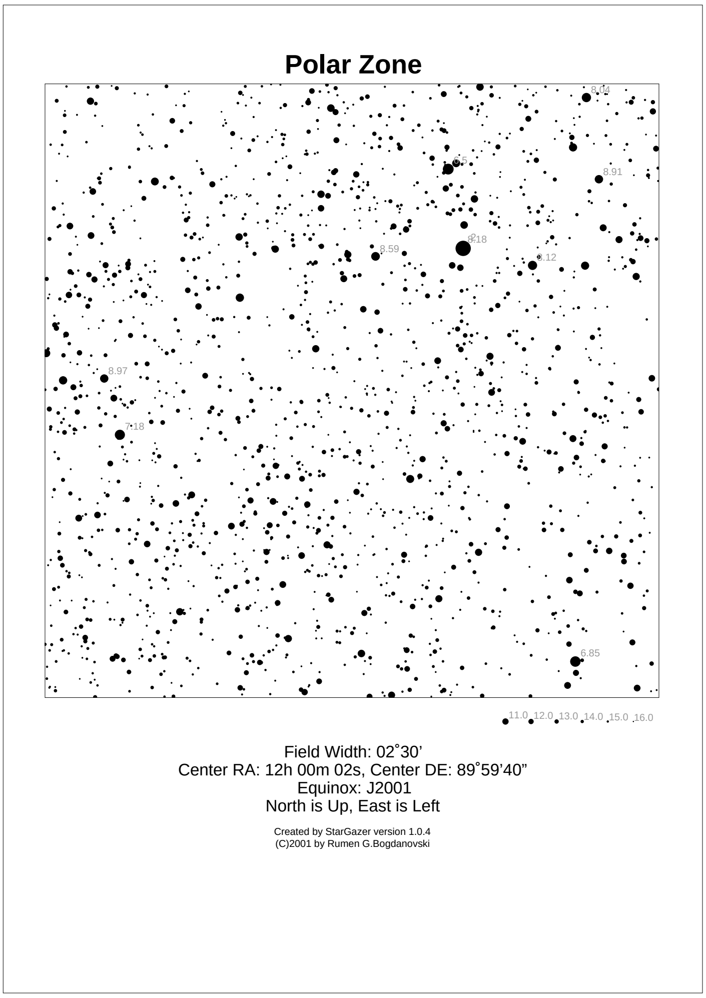

Figure 3: Map of the North Pole zone, prepared for A5 paper printing.

corresponding fields (see Figure 1). A concise description of the fields is given below:

Map Title – Title of the map (optional).

Center RA – Right Ascension of the map center in hours.

Center DE – Declination of the map center in degrees.

Coordinates equinox – Equinox of the "Center RA" and "Center DE" in years - usually 2000 or 1950. If not specified, the equinox of the catalog coordinates is used.

Map equinox – Equinox in which the map will be drawn. If not specified, the equinox of the catalog coordinates is used.

Field of view – Field of view of the map in degrees.

Catalog – Catalog used for the map drawing.

Magnitude limit – Magnitude of the faintest star on the map (optional default is 10).

Label limit – Magnitude of the faintest labeled star(optional).

Label type – Type of the labels used for the stars.

Media type – Paper type on which the map will be printed.

Grid density – Maximum grid lines (if any) in each dimension. The real number of the grid lines is usually smaller than the given, because StarGazer is trying to find "nice" grid steps for RA and DE .

Gridline style – The kind of line that should be used for drawing the Gridline. This option does nothing if "Grid density" is set to "No grid".

Output file format – File format of the map. PostScript or PDF format can be generated by StarGazer.

Clicking the button "Generate the map" will force StarGazer to generate the specified map. It will be downloaded by the web browser to the local machine. The PostScript map requires GhostScript package to be visualized and printed on a non PostScript printers. The downloaded PostScript chart could be sent directly to the printer if there is a PostScript compatible one. Adobe Acrobat Reader is required for the PDF maps.

Conclusion

StarGazer is an Internet service for producing finding star-charts for both professional and amateur astronomers. It is flexible, extensible and it is being actively developed nowadays.

StarGazer is hosted by the Institute of Astronomy, Bulgarian Academy of Sciences. There are big opportunities for future development – adding photometric standards, instructions for finding some objects (ie puzzle solutions and observations from the NGC/IC project) etc.

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