GENEVA PHOTOMETRIC BOXES. IV. A REFINED METHOD FOR DIRECT ACCESS

Bernard Nicolet
Observatoire de Genève
CH-1290 Sauverny, Switzerland

Abstract. In the Geneva photometry, a photometric box around a so-called central star is the set of stars having almost the same colours as this central star.

For the most current applications, it is useful to construct the boxes of a few hundred stars. A method allowing to obtain these boxes rapidly is described. It is based on so-called direct access square files. A FORTRAN routine on a UNIVAC 1160 computer is widely used at the Geneva Observatory. The principles described in this paper may be easily adapted to build square files and to write routines in evolved languages for most computers.

Other applications of square files are also outlined.

1. INTRODUCTION

The Geneva photometric boxes were initially described by Golay et al. (1969, 1977). Nicolet (1981a) has extended this description. Their homogeneity as tested by Golay (1978a), Crézé et al. (1980) and Nicolet (1981a) allows various applications such as calibration of open clusters (Golay 1973, 1978b, Nicolet 1981c), estimations of faint reddening (Nicolet 1981b), reddening laws in the UV (Nicolet 1982) and so on.

Golay and Mandwewala (1977, 1978) have prepared two catalogues of photometric boxes based on the second Geneva photometric catalogue by Rufener (1976). A new catalogue (Nicolet 1981d) is almost ready from the third Rufener (1981) catalogue. It will be available on magnetic tape and microfiches (no printed version) and announced in the Supplements of Astronomy and Astrophysics.

The aim of this paper is the description of a method allowing to obtain fairly fast boxes for some central stars.

C. Jaschek and W. Heintz (eds.), Automated Data Retrieval in Astronomy, 277–280.

2. PRELIMINARY CONSIDERATIONS

The principles used to construct photometric boxes are quite simple:

a) Sort the Rufener (1981) catalogue using the parameter Δ as a key. Recall that $\Delta=(U-B_2)-0.832\ (B_2-G)$ is almost insensitive to reddening.

b) Find the central star with its Δ.

c) Select in the sorted file candidates having a Δ compatible with belonging to the box.

d) Examine each candidate with all criteria.

A question remains: how to organize the sorted file?

a) Direct access. Advantage: the only candidates (typically 200) are read. Drawback: Each direct access reading needs 0.1 sec on a UNIVAC 1160, hence the construction of a box needs about 20 sec of I/O time.

b) Sequential access. The software of most computers (e.g. our UNIVAC 1160) allows a very fast sequential reading of a file: typically 0.002 sec per record. On average half of the file (~7500 records) is read. The CPU time is also non-negligible. The construction of a box needs up to 30 sec.

3. SQUARE DIRECT ACCESS FILES

It is possible to combine the advantages of the sequential and direct access. In principle each record includes the information for many stars and each reading provides many candidates, hence the I/O time is divided by the number of stars in a record.

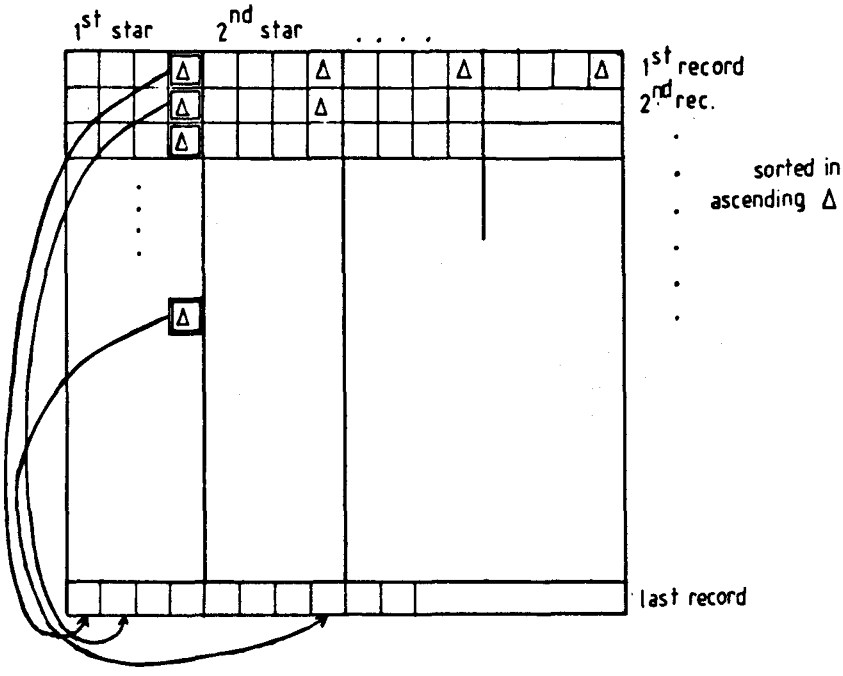
In our method, we use square direct access files. The number of words (36 bits for the UNIVAC 1160) is equal to the number of records whence the adjective "square". The last record plays the role of contents and its i^{th} word is the key-parameter Δ of the first star in the i^{th} record. This last record is read once and kept in the memory.

As a numerical example, let us describe the square file used to construct the Geneva photometric boxes.

Number of stars:	15000 (Rufener 1981)
Number of words per star (packed form):	11 wds
Length of a record:	440 wds
Number of records:	440
Number of candidates per reading:	40 = 440/11

Hence 2-4 readings per box
880 words in the memory (last record + current record)
0.3 to 0.5 seconds computer time per box.

https://doi.org/10.1017/S025292110008310X Published online by Cambridge University Press



Having the central star, we may obtain its colours and quickly select our candidates

colours

Δ : key parameter

last record

$n=n(\Delta-\varepsilon)$ ε : size of the box

read record n

$j = 0$

$j = j+1$

$n=n+1$ Yes $j \overset{?}{>} 40$

No No

$\Delta_{cand} \overset{?}{>} \Delta+\varepsilon$ No Other criteria? Yes Box's star

Yes

End of box

https://doi.org/10.1017/S025292110008310X Published online by Cambridge University Press

4. OTHER APPLICATIONS

The same procedure may of course be applied to other photometric systems. But "coordinate boxes" may also be useful

a) to solve some identification problem

b) to draw identification charts

It is advisable to avoid the right ascension α as a key parameter (polar regions!) δ or more refined key (such as the celestial cube) are more advisable.

REFERENCES

Crézé, K., Turon-Lacarrieu, C., Golay, M., Mandwewala, N.: 1980, Astron. Astrophys. 85, 311
Golay, M.: 1973, IAU Symp. No. 54, p. 27
Golay, M.: 1978a, Astron. Astrophys. 62, 189
Golay, M.: 1978b, IAU Symp. No. 80, p. 277
Golay, M., Mandwewala, N.: 1977, Publ. Obs. Genève Série B, No 4
Golay, M., Mandwewala, N., Bartholdi, P.: 1977, Astron. Astrophys. 60, 181
Golay, M., Peytremann, E., Maeder, A.: 1969, Publ. Obs. Genève, Série A No 76, 44
Nicolet B.: 1981a, Astron. Astrophys. 97, 85
Nicolet B.: 1981b, to appear in Astron. Astrophys. Suppl.
Nicolet B.: 1981c, to appear in Astron. Astrophys.
Nicolet B.: 1981d, to be announced in Astron. Astrophys. Suppl.
Nicolet B.: 1982 , in preparation
Rufener F.: 1976, Astron. Astrophys. Suppl. 26, 275
Rufener F.: 1981, to appear in Astron. Astrophys. Suppl.