Image Processing: The Software Gap

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An enormous amount of work has been invested in astronomical computer programmes. Dr. Rudy Albrecht of the Vienna Observatory explains how much time and effort has unfortunately been wasted because of duplication and lack of documentation. The situation may change, however, with the publication of the "Circular of the IAU Working Group on Computer Processing of Astronomical Data" which attempts to coordinate astronomical programme writing.

Everybody who has ever used a computer for the reduction of a large amount of data is familiar with the situation: one is confronted with the intricacies of an operating system, which works according to the strangest rules. The astronomical problems implied in the data almost disappear out of sight when compared to the alien demands of command string syntax and job control. Trying to use existing software is even more frustrating: there are countless programmes around that do almost what you want—but none of them exactly so. The only promising one was written by a graduate student, who since left, and no documentation of any kind can be found anywhere!

So finally you settle down and produce yet another programme that just does the job for your data. It will not work for anybody else, nor for other data. It is certainly not documented, because "it would have been a waste of time".

This type of inefficient software generation is going on right now in many observatories around the world. The mere fact that it is a waste of human intelligence should be reason enough to try to change the situation. The other, more convincing reason is the new astronomical tools that are becoming available to the astronomical public: IUE and the Space Telescope.

The type of data produced by panoramic (two-dimensional) detectors cannot be handled with traditional methods, because the reduction algorithms, commonly known as "Image Processing", are too sophisticated, and generating (and regenerating) them would exceed a single man's time. Back in the early days of photography and later for photoelectric photometry it was possible for one man to understand the theory behind the detector, build the device, carry out the observations and finally interpret the data astronomically. This is clearly not possible any more.

The situation in Europe with respect to the reduction of ST-generated data is by now foreseeable: There will most probably not be a central institution, where all the data reduction facilities are concentrated, but rather a network of national and local centres, each having their own processing facilities and probably concentrating on different aspects of the data, depending on the astronomical interest.

Some sort of software sharing has been proposed, either via firm links, facilitated by identical hardware, as will be the case in the United Kingdom. Or the exchange of programmes on magnetic tape between institutions with no compatible hardware. This approach is a necessity for ST, but it should certainly not be restricted to it.

Clearly, certain rules must be followed in order to make the software easily exchangeable among the institutions. It is a fact that the programming style of most astronomical application programmes never goes above the level of introductory programming courses. Top-down development and programme structuring is very rarely being used. This makes it difficult to implement programmes on other installations, even if the programming language is completely compatible. However, it will be difficult to get good people to write good programmes, designing and documenting them according to certain rules as long as they will not get "payed back". In other words, as long as the only drawback of not adhering to the rules is that you will never be asked again to submit a programme, these rules cannot be enforced.

It has to be recognized that the development of a programme, although it is really a tool, represents a lot of work in terms of time and effort. However, it is obviously not possible to publish a programme in an astronomical journal. Since astronomical problems are not very interesting for the world computer community, it cannot be published in a computer journal either.

In an effort to provide a publication medium for just such matters, we are trying to make use of the *Circular of the IAU Working Group on Computer Processing of Astronomical Data*. This "Circular", originally edited by C. T. Bolton of David Dunlap Observatory, was intended to be a communication device for PDS users on technical matters and it should still serve as such. Since software problems are the logical extension of technological problems, the publication of programmes and software-related matters is not contradictory to the original intentions. Moreover, the comparatively informal publication in a working group circular provides the possibility to report on things that have not taken final shape and may provide some helpful advice for other readers, who are working on a similar problem.

The "Circular" is now being edited jointly by Drs. Massimo Capaccoli of the Padova Observatory and Rudolf Albrecht! Contributions are invited on topics of software standards, compatibility, etc. Please follow the rules for camera-ready manuscripts. Programmes that are useful to others should be published with full documentation *plus* source listing.

Please send your contributions to:

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Tentative Meeting Schedule

The following dates and locations have been reserved for meetings of the ESO Council and Committees:

November 13	Scientific/Technical Committee, Geneva
November 14-15	Finance Committee, Geneva
November 16	Committee of Council, Geneva
November 29-30	Council, Munich
December 4-6	Observing Programmes Committee, Geneva