Digitised Wide-field Surveys

Digitization in Astronomy

The next few years will see a shift away from photographic plates towards CCDs as the sensors of choice for wide-field surveys. This shift is driven as much by the rapidly improving CCD technology as by the decreasing availability and increasing price of photographic plates. Since digitization, reduction, analysis and storage are mandatory parts of a modern survey, the telescope, detector and data system must be integrated and optimized to form a single, efficient system. These issues will be discussed, and emphasis will be placed on using the experience gained from the reduction of photographic surveys and from recent developments of CCD technology.

D.G. Monet
US Naval Observatory, Flagstaff Station
PO Box 1149, Flagstaff, AZ 86002, USA

Digitization Programs at the STScI

The program to facilitate community access to the first generation of STScI scans of Schmidt plates continues with the publication of a lightly compressed (10x) version of the UK SERC-J/EJ materials this year, to be followed by the same for the POSS-I (E) material next year. This collection, approximately 100 CD ROMs, will be supported by a full set of photometric and astrometric calibrations, to be provided in 1995.

The STScI digitization of the POSS-II survey (J, F and N) has been initiated in a collaborative arrangement with Caltech. Additionally, by arrangement with the AAO, we are also scanning the Second Epoch Southern Survey, currently being made with the UK Schmidt.

About 250 second generation scans will exist at the time of the meeting, and microdensitometer enhancements to bring the scanning rate to about 1000/year are approaching fruition. All new scans are being made with 15μm sampling, 23040^2 rasters, local metrology better than 0.5μm, and with good registration of densities to at least 4.2.

Ultimately the new scans will be published as another set of CD ROMs; in the meantime, some level of small-area access via the HST archive is contemplated.

B.M. Lasker, et al.
Space Telescope Science Institute
Homewood Campus,3700 San Martin Drive
Baltimore, MD 21218,USA

Scanning the Sonneberg Plate Archive with DIA

DIA (Digital Image Analyser) is a new dedicated CCD line scanner, which has been invented at Sonneberg Observatory in collaboration with the Institute for Theoretical Astrophysics at Tübingen for scanning selected fields of the Sonneberg Plate Archive.

The poster describes the whole scanning device, consisting of the 12-bit-scanner camera, its electronics, lighting unit, moving table, base and work station. It is intended to demonstrate this device during the symposium.

Some ideas concerning the automatic detection of objects on the plates scanned as well as brightness determination and position determination of these objects are outlined.

P. Kroll
Sonneberg Observatory, Germany

P. Neugebauer
Institute for Theoretical Astrophysics
Tübingen, Germany

Some Results of CCD-Camera based Astrometric Plate Measurements

Since 1991 the upgraded MANN 422F comparator (HAM I) at Hamburg Observatory has been in routine operation and more than 1000 plates have been measured with a speed of about 10 stars per minute using a Hamamatsu 256px sq. CCD camera.

The repeatability of x,y measures is about

0.2 μm, while the measuring accuracy is about 0.4 μm with no termal drift detectable at this level of precision. An external plate to plate error of less than 0.8 μm could be achieved over areas as large as 220 mm squared.

Results of some specific examples will be shown:

- 29 plates of 7 radio stars (USNO BBAO astrograph, New Zealand)
- 4 plates of > 2700 stars over the entire field (ZA astrograph, Hamburg)
- some ESO Schmidt plates with a 1 degree squared field at plate centre.

N. Zacharias, C. de Vegt, L. Winter and W. Weneit
US Naval Observatory, bld. 1 room Q
3450 Mass Av. NW, Washington DC 20392

A Universal Microphotometer and Solar Corona Polarimetry

Realization of solar corona polarimetry pertains to astronomical centre-symmetrical problems, but application of usual ways of digitization complicates this task. Coronal images obtained during solar eclipse consecutively at different angles of the polarizer should be digitized symmetrically in relation to the centre of the solar disk. Unfortunately, digitization of such centre-symmetrical images is usually performed by rectangular scanning with firmly oriented slit and corresponding pixels have to be found by methods of shifting the centres of the corresponding images and necessary rotation of them. The final fitting of the images can be, of course, tested by calculating the best correlation. Nevertheless, due to the incompatible networks of digitization, some information is changed or even lost.

To avoid complications with rectangular network when processing the centre-symmetric images, we used A universal microphotometer in the mode of polar scanning. The consecutively obtained solar corona pictures were properly oriented on the measuring table. Then, the centre of the Moon was precisely found using points at its circular periphery. After inserting the difference of coordinates between the Moon's and Sun's centres for each time of observation, scanning of solar corona image in polar coordinates started, while orientation of the slit was controlled to the tangential to solar radius at each position. As the relevant pictures were measured at the same orientation, the corresponding pixel values were located at the same positions in the digitization matrix. Then the intensity values in corresponding pixels of relevant images can be easily processed to evaluate the real corona brightness and the degree and direction of its polarization. The principal advantage of the measuring process, its results, as well as the universal microphotometer characteristics are described.

P. Kotrč and M. Knížek
Astronomical Institute, 251 65 Ondřejov
Czech Republic

J. Sýkora
Astronomical Institute, 059 60 Tatranská Lomnica, Slovak Republic

Digital Surface Photometry of the Milky Way

This paper presents surface photometry of the Southern Milky Way ($200° < l < 60°$, $-40° < b < 40°$) with an angular resolution of $0.25° \times 0.25°$ in the standard photometric bands U, B, V, R. The photometry is based on 7 to 10 photographic plates (in each band) which were calibrated photographically as well as by simultaneous photoelectric scans, and corrected for zodiacal light, airglow, and atmospheric extinction and straylight. The photometry was also combined to form colour maps in U-B, B-V, V-R. The maps show clearly the large-scale and small-scale structure of the Milky Way. Basic information on the galactic absorption layer, the spiral structure, the parameters of the disc and of the bulge, extracted from an analysis of the photometry, will be presented.

Th. Schmidt-Kaler
Ruhr-Universität Bochum
Astronomisches Institut
Postfach 102148, D-4830 Bochum, Germany