Title:/Titre:/Titel:

Development of an Orthophoto A/D Converter

Author (s)/Auteur (s)/Autor (en):

Minoru AKIYAMA

Abstract:/Sommaire:/Zusammenfassung:

Remote sensing using aerial photographs usually need preprocessing to correct image coordinates using a kind of digital terrain model data. On the other hand, differential rectifier can suply geometrically corrected images; orthophoto images, however, not in numerical forms but as a film.

In order to combine those two tecniques, orthophoto A/D converter was developed. This equipment can collect digital orthophoto image data and digital terrain data by attatching a differential rectifier.

A mechanism of this equipment and data quality of some test data will be discussed.

Title:/Titre:/Titel:

STATUS AND FUTURE POTENTIAL OF AUTOMATED PHOTOGRAMMETRIC SYSTEMS

Author (s)/Auteur (s)/Autor (en):

Dr. M. Mosaad Allam

Abstract:/Sommaire:/Zusammenfassung:

Present automated photogrammetric instruments are limited to the generation of digital elevation models, orthophotos and stereo-orthophotos. In these instruments the various operational components of the system (input, correlation, control and output units) are integrated to simultaneously perform the photogrammetric process in an on-line mode. As a result of this design the loop between the various units cannot be interrupted by the user to enhance the process or to record the output at an early stage.

The design of future automated systems is based on the operation of the various units autonomously with the proper links between the sub-systems to optimize the I/O processes and to allow for user control of the operation. This will be dictated by the desire to extract additional information,e.g. automatic planimetric feature deatail extraction, and the processing of digital imagery acquired from space or airbornne sensors. The paper discusses the status and future potential of automated and semi-automated systems, their capabilities and the degree of human interaction.

Title:/Titre:/Titel:

THE STATUS OF THE ISPRS CORRELATION TEST

Author (s)/Auteur (s)/Autor (en):

Dr. M. Mosaad Allam

Abstract:/Sommaire:/Zusammenfassung:

An International test has been conducted to evaluate the capabilities of several image correlators to provide answers to several aspects of digital image matching (correlation), namely:

1) the accuracy of automatically generated digital elevation models;
2) the effect of image density, terrain topography, elevation biases and image contrast on the stereo image correlation process; and
3) the correlator's ability to generate surface shells.

The test material consisted of four stereo photogrammetric models at scales from 1:16 000 to 1:80 000, with variations in terrain coverage and imagery. Fourteen organizations in eight countries are participating in the test, with different types of correlators (electronic, digital and off-line systems). The paper includes a brief description of the different correlators tested, the operational procedures, the results of the evaluation and the time comparison of the systems as reported by the participants in the experiment.

CONFIGURATION, IMPLEMENTATION, AND PERFORMANCE EVALUATION OF A ROLL COLOR-FILM RECORDER

By J. E. Boyd and L. R. Oleson
U.S. Geological Survey

ABSTRACT

Although color-film recorders have been available for several years, the capabilities in essential performance catagories exhibited by a new roll color-film recorder manufactured by MacDonald-Dettwiler and Associates are especially impressive. The criteria evaluated include image area, image recording speed, geometric accuracy, spot size, operating cost, and operational simplicity. At the EROS Data Center the unit, called the FIRE-240, is attached to a Digital Equipment Corporation 11/780 computer that supplies data in either band-sequential or band-interleaved format from magnetic tape or disk. A primary design objective was to have sufficient throughput to record at least 50 multispectral scanner (MSS) images in one eight-hour shift with a single film-load operation.

Data is presented in tabular form that documents the performance of the system when latent images are recorded from both tape and disc files in each of four image formats. These formats include 28.5-, 50.0-, and 57.0-micrometer spot sizes that are formed by automatically inserting the appropriate aperture into the light path. One of the formats defines a 57.0-micrometer spot that is formed by subpixelling the 28.5-micrometer spot, and the effect of this technique on image resolution and raster structure is described. Format parameters for up to seven types of images, any one of which is selectable from the host computer, are contained in programmable read-only memory (PROM). Lookup tables, which permit specific film-response functions to be achieved, are electronically transferred from the host to random-access memory (RAM) contained on the film recorder interface board.

The steps involved in processing and printing the latent image to produce a customer product are illustrated. A color negative film master is recorded by the FIRE-240 and from that master a film or paper customer product is made. This two-step procedure allows precise color balancing to be accomplished, to correct for slight process variations that normally occur in the development of a batch of color images. The quality of the final product — as measured by geometry, scale, color registration, uniformity, radiometry, microimage structure, and modulation transfer function — is compared to that of a manually composited image. Production cost and delivery time of color images, produced both conventionally and on the FIRE-240, are also compared.

Title./Titre./Titel: An Application of the Kern Correlator

Author (s)/Auteur (s)/Autor (en): Louis Cogan / D. Hunter
Kern & Co. Ltd. - Aarau
Switzerland

Abstract/Sommaire/Zusammenfassung

This paper describes the KERN CORRELATOR which is used with the KERN STEREO RESTITUTION INSTRUMENTS DSR-11 and DSR1, and the application of the correlator to the collection of Digital Terrain Model Data.

An explanation is given of the correlator hardware and software, the Kern DTM data collection program and the application of the correlator to the data collection.

The results and statistics obtained from some practical tests are shown.

Other possible applications of the correlator in the photogrammetric process are outlined.

Title Titre Titel

RELAX: A PROGRAM FOR THE SIMULTANEOUS RELATIVE AND ABSOLUTE ORIENTATION OF MODELS IN THE ANALYTICAL PLOTTERS

Author Auteur Autor

Prof. Sergio DEQUAL - POLITECNICO DI TORINO - ITALY

Abstract Sommaire Zusammenfassung

As known, a simultaneous relative and absolute orientation of a stereo-pair of photographs gives the most rigorous solution to the problem of the definition and orientation of a stereomodel. This can be achieved easily on an analytical plotter by using the RELAX program, that leaves the operator free in the choice of type and distribution of points, and make the orientation phase very fast and accurate.
RELAX has been developped for this purpose on the new Analytical Plotter "Digicart" by Officine Galileo.
The operating procedures and the structure of the program are described, and some practical results are shown.

Title:/Titre:/Titel:

Interactive Image Processing in Cosmic Remote Exploration with GDR Image processing systems

Author(s)/Auteur(s)/Autor(en):

Dipl.-Ing. Christine Dorn, VEB Robotron-Vertrieb Berlin DDR
1086 Berlin

Abstract/Sommaire/Zusammenfassung:

The lecture deals with the objektives of image processing and their application possibilities for solving the tasks of cosmic remote exploration.
It is described the robotron solution in supplying a turnkey hardware system including a image software package for analysing data from CCT's and MSS from satellites like LANDSAT 1, 2, 3 and in future 4, METEOSAT, TIROS and other.
As an advantage is described a robotron heigh speed display processor (parallel pipeline, 12,5 x $10^6$ operations/s for each data stream) as well as the input of film material,,f.e. MFK 6, by a laser beam film recorder/scanner (10 $\mu$m resolution, 200 kbyte/s, 256 grey levels) of VEB Carl Zeiss JENA, GDR.
Spezial application software packages and new solutions in the field of multispectral classification are discussed.

# AN MIMD PARALLEL ARCHITECTURE FOR CONTEXT-DEPENDENT CLASSIFICATION OF REMOTE SENSING DATA

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Context dependent classification is an important procedure for which the conventional von Neumann computing structure is not very useful, as the data dependence can not be employed effectively. A new type of computing structure has been developed, which allows parallel computation with a distributed control of operations. This has required the development of a new type of information representation and a set of symmetry operations that work in a hierarchical structure.

A computer implementing this architecture has been operative for 4 years. It has been found to be very effective for context dependent operations, which it can implement at a speed up to 100 000 times higher than a conventional computer. Examples from classification of remote sensing data will be presented.

# WORKING GROUP II.5: ACTIVITIES AND CRITICAL AREAS

by J.P. Guignard

Abstract

This paper reviews the activities of the Working Group II.5 (Instrumentation for SAR Processing) since its creation at the previous ISPRS Congress (Hamburg, 1979).

During the serious meetings of the group (Frascati 1980, Ottawa 1982 and Tokyo 1983), particular attention has been paid to six topics:

- SAR on-board processing
- Ground preprocessing
- Algorithms for preprocessing
- Acquisition, validation, simulation and calibration
- SAR processing and image interpretation
- Radargrammetry and merging of multi-sensor data.

The evaluation over the four-year period 1980-1984 is synthetised while the present critical areas are identified as an introduction to the second session of the Working Group in Rio de Janeiro (June 1984).

It turns out that new instrumentation is required to offer the possibility of using SAR data as part of a multi-sensor remote sensing approach. This aim is demanding in terms of speed of preprocessing, compatibility with other sensor data (data banks), validation, calibration and last but not least, optimal extraction of information.

It is anticipated that this evolution will be confirmed in the next few years and it is proposed to develop the future activities of the working group along these lines.

Title:/Titre:/Titel: "AN EVALUATION AND TEST OF THE QASCO SD-4 STEREODIGITISER"

Author (s)/Auteur (s)/Autor (en): L.C. HOLSTEIN and L. BERLIN

Abstract:/Sommaire:/Zusammenfassung:

This paper reports on the testing and evaluation of the QASCO SD-4 analytical plotter, appraised from the view-point of a teaching and research institution. The procedures followed were, in general, those proposed by Working Group II-1 and include tests and comments on the following components or aspects: mechanical features, optical train, the control electronics, operator controls, the control computer and the software. The accuracy, precision and stability of SD-4 were tested and are reported upon in this paper.

Title./Titre./Titel: Hardware and Software for digital data collection for Land Information Systems

Author(s)/Auteur(s)/Autor(en): Jacob Klaver - Photogrammetric Engineer
Kern & Co. Ltd. - Aarau
Switzerland

Abstract/Sommaire./Zusammenfassung

Digital data collection for Land Information Systems requires hardware- and software components which are capable of handling the three main tasks: data acquisition, data editing and data presentation in an efficient manner.

In the framework of the Kern Computer Aided Mapping System the modules for a small system as well as the possibilities for data transfer to existing large systems are described.

Title:/Titre:/Titel:

Raster-to-Vector Conversion System

Author(s)/Auteur(s)/Autor(en):
M.Nakamura , K.Suzuki ,and T.Harada

Abstract:/Sommaire:/Zusammenfassung:

PASCO Corporation has developed original raster-to-vector conversion system to build digital data of contours in 1:25,000 topographic maps. The system is composed of five processes, ; 1) data acquision process by a drum scanner ;;2) thinning or skeletonizing of contous (raster data) ; 3) processing of raster-to-vector conversion ; 4) vector editing on CAD system ; 5) scaling and leveling of contours(vector data).

Title:/Titre:/Titel:

A Remote Sensing Data Processing System using Micro-Computer and its Analysis Expamples

Author (s)/Auteur (s)/Autor (en):

Prof. Dr. Taichi Oshima
Kiyoe Miyashita
Joji Iisaka
Dr. Sotaro Tanaka

Abstract:/Sommaire:/Zusammenfassung:

Though, in general, the processing system for remote sensing data requires a large-capacity to manage the large amount of data, we usually need to analyze only a small part of the area of a scene given by a Landsat.
Nowadays remote sensing techniques are applied to many different fields and users have come to expect handy and low-cost instruments of analysis that can be worked by anybody. Now we are able to buy a good quality micro-computer with peripheral units at a low price because the electronic technology has developed rapidly.
This paper describes fundamental studies of a man-machine communication system for anlyzing remote sensing data based on a micro-computer which was developed by our group. For convenience this systems will be abbreviated " TRESS " for Tiny REmote Sensing data processing System and " I- DAS " for Image Data Analysis System.

Title:/Titre:/Titel:

Final Report on the Rastar Correlator Development

Author (s)/Auteur (s)/Autor (en):

Dietmar Pape

Abstract:/Sommaire:/Zusammenfassung:

Since now the development of the Rastar Correlator has been brought to a conclusion this paper will present a short revue on the development process and a detailed information on the basic features of the existing system. These features include: high speed on line correlation, scanning in epipolar lines, CCD image sensors, multi-channel parallel hardware logic, determination of the best match by cross correlation, multispectral signal processing in seven frequency bands, geometric rectification within the correlation window and correction of y-parallaxes. Test results from fully automated D.E.M. evaluations will be treated including orthophoto and contour map production. Means of sub-pixel accuracy parallax detection with the Rastar Correlator will be referred briefly.

Title:/Titre:/Titel: Analytical Stereoplotters Testing Procedures

Author (s)/Auteur (s)/Autor (en): Leslie H. Perry

Abstract:/Sommaire:/Zusammenfassung:

Various testing procedures for analytical stereoplotters have been defined by various parties within the photogrammetric community. These procedures have primarily dealt with the hardware components of a stereoviewer. The real measure of an analytical stereoplotter is the workings of the soft environment of the electronic controller. There are as many software solutions, taking into account: viewer hardware, controller hardware, operating system, and philosophy of handling photogrammetric and related algorithms, as there are analytical stereoplotter instruments available. Testing procedures to deal comprehensively with all of these varied solutions would be a futile effort. However, there do exist testing procedures to provide quantitative information on the primary computation of model-to-photo transformation. This document collects various hardware testing procedures that have been defined previously and introduce some generalized software testing procedures that should be compatible with most analytical stereoplotter systems. This document is intended as a supplement to the "Analytical Plotter Evaluation Guide" to provide some quantitative information that can be used in that comprehensive guide.

Title:/Titre:/Titel:

MULTIUSER SYSTEM IN DIGITAL CARTOGRAPHY

Author (s)/Auteur (s)/Autor (en):

Dan Roman, Cristian Stanescu, Adrian Lustig, Cristian Nasca,
COMPUTER TECHNIQUE RESEARCH INSTITUTE, Bucharest, Roumania

Abstract:/Sommaire:/Zusammenfassung:

We present a multiuser system in digital cartography, realized by the Geometrical Data Processing Laboratory, from ITC(Computer Technique Research Institute). The system includes data aquisition from stereoplotters(1-8) interfaced with a single minicomputer(existent equipements may be used without modifications), from digitizers and alsó in classical manners. By means of an highly interactive language dedicated to photogrammetrical data processing the system realizes: on-line primarely data aquisition, checking, processing and archieving,on-line aerial triangulation and computer assisted map compilation. Due to its flexibility, the system may be tailored in accordance to variated hardware configurations. The Multiuser System in Digital Cartography can be conected to a computer network.

Title:/Titre:/Titel:

Performance capabilities of the RECTIMAT-C Rectifier

Author(s)/Auteur(s)/Autor(en):

Dr.-Ing. Joachim Rulf and Verm.-Ing. Rudolf Schumann, VEB Carl Zeiss JENA, 6900 Jena DDR

Abstract/Sommaire/Zusammenfassung:

The RECTIMAT-C Rectifier is designed to permit the rectification of terrestrial and aerial photographs taken with all common camera systems. The authors demonstrates by examples the range of nadir distances and focal lengths the machine can handle without restrictions. The optical performance of the two lenses is demonstrated by graphs showing the resolving powers for the red, green and blue colour channels and for white light as a function of field angle. The article describes how asymmetrically and symmetrically graded density filters compensate the light loss towards the easel margin with level and tilted easel, and evaluates the light distribution thus achieved.
The high absolute positioning accuracies and the exellent reproducibility of the various settings permit rectification by input data. Graphs illustrate the setting accuracy achieved with input data operation, which is then described by practical examples.

Title:/Titre:/Titel:

IMAGE - Interactive MAnipulation of GEographical Elements

Author (s)/Auteur (s)/Autor (en):

SEIFTER-BARTSCH Karin

Abstract:/Sommaire:/Zusammenfassung:

IMAGE ist ein System zur Erfassung, graphisch interaktiven Strukturierung und Bearbeitung, Speicherung, Darstellung und Auswertung von tachymetrisch und photogrammetrisch aufgenommenen Geländedaten, sowie digitalisierten Plänen. Dieses System dient nicht nur zur einmaligen topographischen Aufnahme eines Gebiets und der einmaligen Darstellung dieses Gebiets, sondern darueber hinaus der fortgesetzten Nachfuehrung von verschiedenartigen Objekten in der Landschaft und der Herausgabe verschiedenartig zusammengesetzter Plaene in verschiedenen Mass-staeben. Das System liegt etwa in der Mitte zwischen einem Zeichensystem (Erstellen, Editieren, Kartieren von Punkten, Linien und Texten) und einem Verwaltungssystem (Landinformationssystem).

Title:/Titre:/Titel:

Array Processing Techniques for Image Analysis

Author (s)/Auteur (s)/Autor (en):

W. M. Strome
D. G. Goodenough
K. B. Fung
A. J. Baillie

Abstract:/Sommaire:/Zusammenfassung:

This paper describes some of the factors which must be considered in implementing typical image analysis algorithms on array processors. Some of the architectural and data flow problems will also be discussed.