GIM 03'00 Pinpoint Tjeu 06-09-2001 14:58 Pagina 11

Virtual Photogrammetric Work Flows

Already for many decades now, images - gathered from air and from space - have represented the most important data source for the collection of information about the earth. The need for images to support geo-managing tasks is growing steadily. Data producers try to keep pace with this trend. The recent successful launch of a Space Imaging Ikonos remote sensing satellite, which produces images with one meter resolution, immediately springs to mind.

Wishful Thinking

In order to extract meaningful information, images need photogrammetric processing. Because of the increasing demand for geo-information, the necessity for automation of photogrammetric processes is apparently growing.
In the mid-eighties, I was involved in research to automate parts of photogrammetric processes. At that time, computer vision systems were available which operated successfully in highly restricted scenes, such as industrial settings. Under these settings, illumination conditions, types of objects and camera positions are rigidly constrained. An exciting thought occurred: that such paradigms might be used to automatically extract maps from aerial and satellite imagery! Our basic notion was to digitise and store aerial images in the computer, to carry out a sequence of processes on the pixels and next to draw the digital map.

Extremely Complex

Notwithstanding our hard work, how disappointing were our results! The visual cognitive abilities of human beings are so highly developed that it is even hard to imagine that such a process might be difficult. No wonder then that we did not succeed in creating operational solutions. In the early nineties the Artificial Intelligence community recognised that the standard computer vision paradigms fail to provide a means for reliably recognising any of the object classes common to the natural outdoor world. This is an obviously hard sign that automatic extraction of roads, houses and other objects remains far out of reach.

DEMs

Even the process that can best be automated - extraction of Digital Elevation Models (DEM) - still requires many human interventions. The main problem is that the wanted surface often does not correspond to the extracted surface due, for example, to the presence of houses, trees and shadows. Therefore, appropriate editing procedures are necessary to transfer the extracted DEM to the desired surface.
IGN (Institut Géographique National) has developed such a procedure, in particular for contour line generation from photogrammetrical DEMs. We invited Mr Dupéret to report for us on this development.

Extinction of Scanners

A basic necessity for digital photogrammetry is to bring the images into a computer-accessible format. Some imagery, usually stemming from satellites and associated with the term remote sensing, is directly recorded in digital format. In the indirect mode, traditionally associated with photogrammetry, the images are recorded by photo cameras. The photos are next scanned to transfer them into pixels. For photogrammetric purposes, preservation of the high geometric accuracy of the original photos is of essential importance. Mainly because of the small and exclusive market, photogrammetric scanners are very expensive. We confronted Dr Baltsavias, who is an expert in this field (see GIM International, July 1998, pp. 55-61), with the question whether of photogrammetric scanners will become extinct because of the rapid developments of digital cameras able to collect digital imagery in a direct way. He provides a wealth of arguments to demonstrate that the need for high quality photogrammetric scanners will last for at least a coming decade and probably more.

Human Objects

Photogrammetry has been traditionally associated with mapping. Because of the limitations of the massive analogue instruments designed for mapping purposes, other application domains, such as the human body, have in the past remained underexploited. This situation has changed strikingly over the last decade. Digital cameras combined with standard software make the approach cost-efficient, while non-photogrammetrists can do the job. In order to give exposure to this expanding part of the spectrum we invited Dr Chong and Mr Pearse to present their work on video-motion analysis of swimmers.

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Although the considerable research into automation did not bring the expected successes, it did enable the replacement of older, specialised, monolithic equipment by software; a revolution resulting in flexible workflows. The Internet is making photogrammetry even more flexible. In the future it will be not necessary anymore to have the data and the tools in your office. You will be able to access both over the Internet just with your computer. Virtual photogrammetric workflows! It will not only be the occasional user who will benefit, but also mapping companies. Workplaces distributed all over the world become an opportunity. Virtual photogrammetric workflows will enable fast adaptation to the data needs of an ever-expanding group of users. This flexibility is particularly useful in a fluctuating market. You may read more about this exciting trend in the article from Dr Drap and Dr Grussenmeyer. Further in this issue, Erdas as well as Z/I Imaging contribute interesting articles providing background information on their solutions to current photogrammetric challenges in relation to the developments and trends sketched above.
Enjoy reading.

Dr Mathias Lemmens, Editor, GIM International
mathias.lemmens@gitc.nl