

Automatic image analysis - new perspectives for photogrammetry and remote sensing

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Abstract

For many years automation was seen as one of the main advantages of digital photogrammetry. Major research and development efforts were spent on image matching techniques in order to automatically generate digital terrain models (DTMs), extract tie points for relative orientation and bundle adjustment, and to generate orthophotos and orthophoto mosaics. Today, these processes are available in modern digital photogrammetric workstations.

Two main factors have changed the prospects of photogrammetry in the last years: (a) direct measurements for the exterior orientation by GPS/INS and for DTM generation by lidar and partly also by interferometric synthetic aperture radar means serious competition for some for the traditional photogrammetric methods such as aerial triangulation and DTM generation; (b) the availability of a largely increased amount of digital imagery from space, in close range applications including entertainment, and lately also from the air leads to a situation in which spatial *data* in the form of imagery is readily at hand everywhere, but on the contrary spatial *information* needed in so many tasks in GIS and beyond is very hard to obtain - perhaps even harder than before, because we tend to be drowned in the huge amount of image data coming in every day.

Taking these developments into account, the extraction of information from all kinds of images must be regarded as the major challenge for photogrammetry in the future. Automation can be subdivided into (a) semi-automatic modules in which a human operator is constantly in control of the process and is being supported by automatic procedures running in real time, (b) automated modules for which the operator needs to define input parameters prior to running the process, and must carry out quality control at the end of the process, and (c) autonomous modules which run completely independent of any human intervention. The key to master this challenge is to carry out research in all three areas to develop concepts, methods and tools capable to deliver the desired products.

This presentation will look at the state-of-the-art and the current benefits of automatic object extraction from aerial and satellite imagery and will discuss trends and possible solutions in research, development and practical applications for photogrammetry in the

era of spatial information technology. In automatic vector data capture from images, also termed image interpretation or image analysis, remarkable progress could be observed over the last decade, mainly focussing on model-based object extraction methodologies. Nevertheless due to the complexity of the task, with very few exceptions it is still being performed manually in practise. In the talk the major issues and challenges for automatic image interpretation, the current-state-of-the-art in research and development, as well as conclusions for future developments are explained and highlighted by means for a number of examples from the work carried out in Hannover.