TOWARDS FULLY AUTOMATIC PHOTOGRAMMETRIC RECONSTRUCTION USING DIGITAL IMAGES TAKEN FROM UAVS

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ABSTRACT:

We argue that the future of remote sensing will see a diversification of sensors and sensor platforms. We argue further that remote sensing will also benefit from recent advances in computing technology to employ new algorithms previously too complex to apply. In this paper we support this argument by three demonstrations. First, we show that an unmanned aerial vehicle (UAV) equipped with digital cameras can provide valuable visual information about the Earth's surface rapidly and at low cost from nearly any viewpoint. Second, we demonstrate an end-to-end workflow to process a sizeable block of such imagery in a fully automated manner. Thirdly, we build this workflow on a novel computing system taking advantage of the invention of the Graphics Processing Unit (GPU) that is capable of performing complex algorithms in an acceptable elapsed time. The transition to diverse imaging sensors and platforms results in a requirement to deal with unordered sets of images, such as typically collected from a UAV, and to match and orientate these images automatically. Our approach is fully automated and capable of addressing large datasets in reasonable time and at low costs on a standard desktop PC. We compare our method to a semi-automatic orientation approach based on the PhotoModeler software and demonstrate superior performance in terms of automation, accuracy and processing time.

TOPIC: Image processing and pattern recognition
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