



Analysis of Lossy Hyperspectral Image Compression Techniques

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Abstract—Graphics Processing Units (GPU) are becoming a widespread tool for general-purpose scientific computing, and are attracting interest for future on board satellite image processing payloads due to their ability to perform massively parallel computations. This paper describes the GPU implementation of an algorithm for on board loss hyper spectral image compression and proposes an architecture that allows accelerating the compression task by parallelizing it on the GPU. The selected algorithm was amenable to parallel computation owing to its block-based operation, and has been optimized here to facilitate GPU implementation incurring a negligible overhead with respect to the original single-threaded version. In particular, a parallelization strategy has been designed for both the compressor, which is implemented on a GPU using MATLAB. Experimental results on several hyper spectral images with different spatial and spectral dimensions are presented, showing significant speed-ups with respect to a single-threaded CPU implementation. These results highlight the significant benefits of GPUs for on board image processing, and particularly image compression, demonstrating the potential of GPUs as a future hardware platform for very high data rate instruments.

Index Terms—Graphics processing unit (GPU), lossy hyper spectral, image compression, MATLAB.

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