

GPU Accelerated FFT-based Registration of Hyperspectral Scenes

Experimental results related to the paper [GPU Accelerated FFT-based Registration of Hyperspectral Scenes](#) by Álvaro Ordóñez, Francisco Argüello, and Dora B. Heras, published in IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing.

Abstract

Registration is a fundamental previous task in many applications of hyperspectrometry. Most of the algorithms developed are designed to work with RGB images and ignore the execution time. This paper presents a phase correlation algorithm on GPU to register two remote sensing hyperspectral images. The proposed algorithm is based on principal component analysis, multilayer fractional Fourier transform, combination of log-polar maps, and peak processing. It is fully developed in CUDA for Nvidia GPUs. Different techniques such as the efficient use of the memory hierarchy, the use of CUDA libraries and the maximization of the occupancy have been applied to reach the best performance on GPU. The algorithm is robust achieving speedups in GPU of up to 240.6x.

Downloads

Algorithm

Compiled program to register two hyperspectral images on GPU.

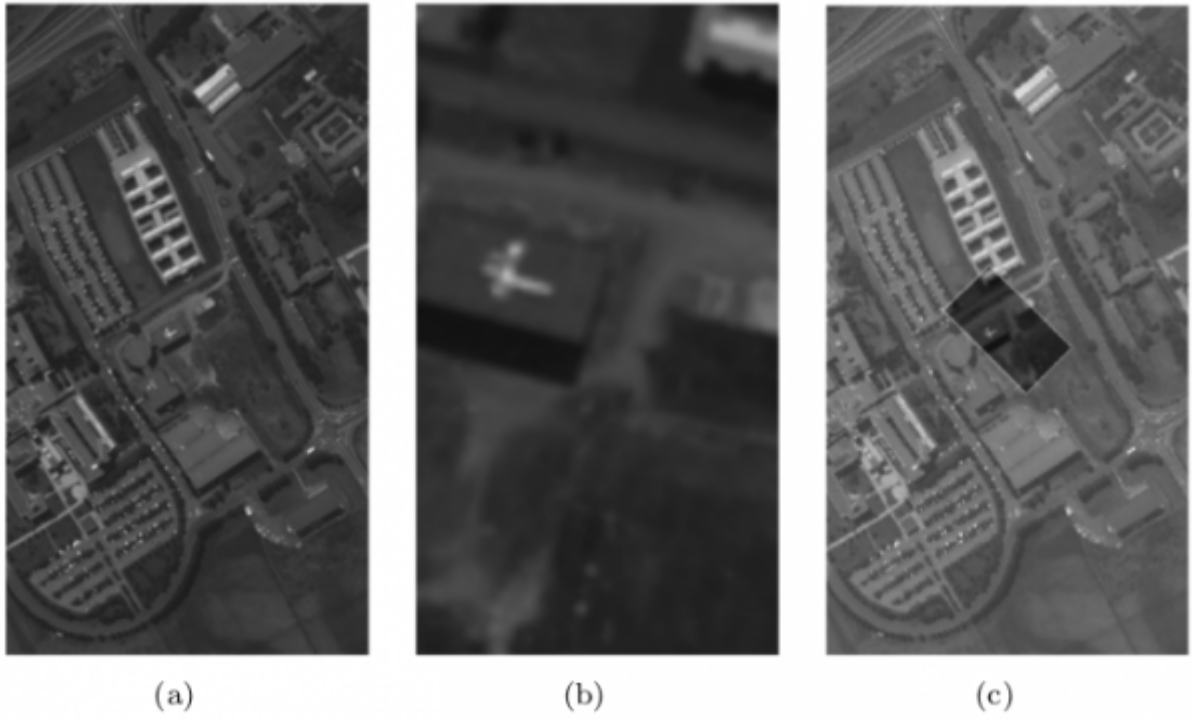
- HYFM algorithm on GPU:

hyfm-gpu.zip

Images

All images used in the paper are available in [Registration Repository](#)

Example



Example of registration process: (a) original or reference image, (b) target image (central region of the original image scaled by 5.5x and rotated 45 degrees), and © result of the registration process showing the superposition of the reference and target image correctly registered.

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