**Accelerated Global Human Settlement Discovery**

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**Abstract**

The Accelerated Global Human Settlement Discovery team is working on an ALCC allocation which has the goal of developing a framework for parallel and distributed deep learning on hybrid CPU/GPU systems. This effortâ€™s main application is the detection of human settlements in remote sensing data, which is part of the Landscan and Gates Foundation grants. An average-sized country can have as much as 200 TB of associated image data.

Our team has had notable success in using machine learning techniques and lately, in the use of deep learning approaches to get better results. The group has access to Summit-dev, three NVIDIA DGX-1 boxes and a small GIST-owned GPU cluster.

We have had successes on Titan where we processed the entire country of Yemen in under two hours using 4758 nodes. This used our custom codes for image management, image pre-processing, and Caffe for the deep learning. We are, however, running into issues with old GPUs and GPU memory limits on Titan. We have spent considerable effort in understanding, compiling, and being able to run various deep learning libraries such as Caffe, PyTorch, Theano, etc. and working with containers such as Singularity for DGX-1s and Summit-dev as we prepare to run at larger scales on Summit-dev and Summit, eventually.