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Image Denoising Using a Total Variation Algorithm

For this term's project in High Performance Computing, I intend to look at the total variation image denoising algorithm. I will look at why this algorithm is considered a good target for parallelization, and I will implement it on at least multiple CPUs and on Xeon Phi. I would also like to implement it on OpenCL on my laptop (Xeon mobile processor with NVidia M2000M graphics card) to see how much of a performance increase I can get using these techniques on a workstation.

The project will require:

1. Literature search on existing implementations and their alternatives
2. Collection (or preparation) of sample images. I would like to use data from the CUSP Urban Observatory, but if other benchmark datasets are available I will also include those.
3. Implementation of a serial version of the algorithm.
4. Implementation of a parallel version of the algorithm in OpenMP and/or MPI.
5. Implementation of a parallel version of the algorithm on Xeon Phi.
6. Implementation of a parallel version of the algorithm on OpenCL.
7. Running of experiments on various platforms.
8. Report on the timing results and scaling performance for the various implementations.