

PARALLEL COMPUTER ARCHITECTURE AND PROGRAMMING
15-618

Parallel Image Compression using the JPEG algorithm

1 URL

<https://spenceryu.github.io/15618-final-project/>

2 Current Progress

We had to scale back our project from the entire video pipeline for MPEG-1 to just the I-Frame (JPEG) component. Since the entire video algorithm is so big, it detracts from the purpose (exploring parallelization), so we had to switch to JPEG encoding instead. We have nearly finished implementing the sequential version of our algorithm. Our encoding process is complete and is able to compress our sample image to 31.6% of its original size. However, the decoding process produces an warped output image. We are also in the process of designing our CUDA implementation.

3 Planned Schedule: Update

Week 0.5 (11/18 - 11/20): Finish sequential algorithm, and continue CUDA algorithm design.

Week 1.0 (11/21 - 11/24): Finish CUDA algorithm design and begin implementation.

Week 1.5 (11/25 - 11/27): Work on CUDA implementation.

Week 2.0 (11/28 - 12/01): Finish CUDA implementation and debug.

Week 2.5 (12/02 - 12/04): Tune performance of CUDA solution.

Week 3.0 (12/05 - 12/08): Explore other optimizations and work on poster.

We will be working on the same tasks together due to the sequential nature of our tasks and the benefit synchronizing our work has on streamlining the debugging process.

Most of our issues so far have been due to debugging our code, and after we design the CUDA algorithm the majority of the work will be just implementing and debugging our JPEG algorithm. The hardest part of debugging is that the JPEG algorithm works in a different color space than the standard RGB (YCbCr) and the algorithm is not very easy to debug due

to the transform domain being used. Once we iron out the issues in the transform, the rest of the algorithm will be fairly straightforward to debug.

3.1 Stretch Goals

1. Vary levels of parallelization in the steps of the algorithm to find the optimal algorithm for speedup.

4 Deliverables

At the poster session, we plan to show a graph comparing the sequential JPEG algorithm's speed vs. a CUDA accelerated version. We will show the results for several images with varying properties to see if the parallel algorithm's relative speedup is dependent on the image type.