Contour Detection on Mobile Platforms

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CBIR on Mobile
- Using Damascene as a case study to understand the capability of modern mobile platforms in terms of:
  - Execution time
  - Power consumption

Damascene Computation Flow
- Image size used for benchmarking: 205 x 154 pixels
  - Due to memory limitations
  - Compiler flags
     - `-O3-vec-vectorize -march=armv7-a -mfloat-abi=softfp`
  - Scalability is very close to linear on the number of threads

Targeting Platforms
- Platform choice of computation
  - Setting all compiler flags delivers a 6x speedup on the 1.5 GB image size used for benchmarking: 205 x 154 pixels

Performance on ARM Cortex A9
- Image size used for benchmarking: 205 x 154 pixels
- Due to memory limitations
- Compiler flags
- `-O3-vec-vectorize -march=armv7-a -mfloat-abi=softfp`
- Scalability is very close to linear on the number of threads

Performance on Core i7 920
- Porting the original CUDA implementation to serial C implementation
  - Using our revised algorithms from the CUDA implementation
  - Using pthread to parallelize routines that execute more than 1 second on a 321 x 482 image
  - Exploring coarse grained parallelism on CPU instead of fine grained parallelism on GPU
  - Image size used for benchmarking: 321 x 482 pixels

Performance on Snapdragon
- Image size used for benchmarking: 205 x 154 pixels
- Due to memory limitations
- Setting all compiler flags delivers a 6x speedup on the contour detection computation
- It is essential to get the compiler flags right on floating point computations

Power Analysis
- Race to halt principle is well applied on the desktop platforms
- Mobile platforms are about 4x0 more power efficient than desktop platforms
- Although the execution time on the mobile platform is about 50x (compared to CPU) to 250x (compared to GPU) slower, it still consumes the least amount of energy
- As long as the image uploading and the results downloading energy is smaller than the computation energy, we should keep the computation on the cloud