Implementing an Agent-Based Model using OpenCL: A Case Study

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Abstract:

The graphics processing unit (GPU) has become an important resource for computational tasks that can be deconstructed into parallelizable operations. Agent-Based Modeling (ABM) can generally be classified as this form of task. We present an OpenCL implementation of an existing ABM used to simulate populations of Anopheles gambiae mosquitoes, an important vector of malaria transmission, to illustrate the potential improvement in execution time GPUs can offer ABMs. Discussed are methods and techniques used to overcome design challenges that can arise when porting ABMs from traditional object-oriented designs to GPU-based designs. The implications for future agent-based software development frameworks are also discussed.