Goals: (1) Create a library of video kernels, based on the AVS (Audio Video Standard) codec. (2) Explore the performance limiting factors on modern multicore architectures.

**Motivation**

Digital video has applications in various aspects of our life:
- **Entertainment** (movies, digital TV, personal videos, video-calling)
- **Sciences** (medical applications, environmental monitoring)
- **Education** (video lectures, tele-education, documentaries)
- **Security** (video surveillance)

Video resolutions increase each generation:
- Full High Definition (1920x1080 pixels) – typical nowadays
- Ultra High Definition (7680x4320 pixels) – on its way
- 3D Video – complicates things even further!

Storage and transmission of uncompressed raw video is prohibitive.

Need for efficient (preferably real-time) video encoding, decoding, and transcoding.

**Results**

Execution time and performance for varying levels of optimization:
- Sequential code (reference)
- Sequential code with software optimizations
- Parallel code with two and four simultaneous threads
- Parallel code with four simultaneous optimized threads

Overall speedup: 4.84 to 5.63

**Optimizations and Tradeoffs**

Single task queue & variable length decoding (VLD) becoming the bottleneck, as the number of cores increase.

Solution?
- Use a distributed queue scheme (1 task queue/core)
- Perform video-related algorithmic changes

**Future Work**

Ongoing research focuses on efficient mapping of the AVS decoder on a GPU.

Future work will focus on applying our techniques to other scientific domains:
- GPUs in bioinformatics
- GPUs in neuroscience

**Related Work**

K. Krommydas et al., “Mapping and optimization of the AVS video decoder on a high performance chip multiprocessor”, IEEE ICME 2010

K. Krommydas et al., “AVS video decoder on multicore systems: optimizations and tradeoffs”, IEEE ICME 2011

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