A Parallelized Implementation of MPEG-4 Global Motion Estimation on Multicore Processors using OpenMP

By

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Video compression requires high computational power. In real time multimedia applications, computations must be performed as fast as possible to meet the strict real-time requirements. Most modern video compression techniques use local and global motion estimation and compensation. A parallel computation model can be applied to enhance the performance and meet real-time requirements of video compression.

In this thesis, we propose a parallel approach to parallelize global motion estimation of the open source code ISO/IEC 14496 MPEG-4 standards. The proposed parallel implementation was tested on multicore architectures, where we used OpenMP to build a parallel model. The parallelization of global motion estimation on multicore processors uses multithreads over shared memory. The proposed parallel implementation divides a frame into a number of independent blocks, each block is assigned to OpenMP section and each section is automatically assigned to a thread to perform its computations. We have implemented in three variations : the frame is divided into two blocks on a dual-core system, the frame is divided into four blocks on an enhanced dual-core system, and the frame is divided into six blocks on a quad-core system.
The experimental results of the proposed parallel implementation show an improvement in performance of the global motion estimation of MPEG-4 computations. The maximum speedup was achieved on the quad-core system, with a speedup of 2.2 for CIF, and 1.97 for QCIF.

**Keywords:** Global Motion Estimation (GME), MPEG-4, parallelization, multicore systems, speedup, OpenMP Model.