

Parallel and Distributed Processing of Visual Content: Traditional View and New Directions

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Abstract

In the recent years, processing of visual content has emerged as a key technology in many areas. Applications include consumer electronics (Kodak's Photo-CD, HDTV, SHDTV, Video-on-Demand, numerous video games), medical imaging (digital radiography and telemedicine), video-conferencing, and scientific visualization. However, the creation, processing, and management of these data types require an enormous computational effort, often too high for single processor architectures. Therefore, this fact taken together with the inherent data parallelism makes image processing and video processing natural application areas for parallel and distributed computing.

Traditionally, custom hardware design has been an important topic in this area (e.g. MPEG cards or block-matching units). Also, many algorithms and applications have been implemented on general purpose high performance computing platforms and supercomputers.

More recently, software based approaches on off-the-shelf processors and media processors are becoming popular in this area because of the performance increase of general-purpose processors and the rapid evolution of multimedia techniques which has dramatically shortened the time available to come up with a new hardware design for each improved standard. In this context, "embedded" multimedia is a hot topic nowadays. Here, on-chip parallelism, hyperthreading, and the efficient use of SIMD-type multimedia extensions are of great importance.

On the other end of the spectrum, Grid-computing attracts a high amount of attention in the high performance computing community. With respect to Grids, distributing image and video processing applications across extremely heterogeneous processor farms and networks in a reliable fashion is a challenging task. On the one hand, the distributed processing aspect poses new research questions, on the other hand the distribution aspect itself is worth to be looked at.

Based on experiences from organizing the workshop series "Parallel and Distributed Image Processing, Video Processing, and Multimedia PDIVM", the EuroPar Multimedia topic, and other editorial activities we will identify past, current, and future trends in the research lines associated with processing of visual content on parallel and distributed systems.