

A Reconfigurable Computing Framework for Multi-scale Cellular Image Processing

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Cellular computing architectures represent an important class of computation that are characterized by simple processing elements, local interconnect and massive parallelism. These architectures are a good match for many image and video processing applications and can be substantially accelerated with Reconfigurable Computers. We present a flexible software / hardware framework for design, implementation and automatic synthesis of cellular image processing algorithms. The most novel aspects of our framework include several hardware-in-the-loop supervised learning algorithms for optimal cellular image processing and a new highly pipelined architecture for multi-scale cellular image processing. In this article we describe the system in detail, present our performance assessments and conclude with some application examples in video processing.