Abstract

The Median Filter (MF) is considered one of the computationally intensive problems in the image processing domain. MF can be implemented on heterogeneous clusters consisting of CPUs, Nvidia GPUs, and Xeon-Phi coprocessors (MIC) architectures. This heterogeneity adds more complexity to the problem and is considered a challenging one. This paper deploys a speed-based scheduling strategy to implement the MF on a heterogeneous cluster. The strategy is used to schedule tasks on heterogeneous architectures based on their speed. Basically, suitable parallel computing paradigms such as OpenMP, and CUDA can be used on individual architectures to perform sample set of tasks. Then, the actual number of tasks will be assigned to each one based on its actual speed. The MF operation can be implemented such that the total run time will be significantly improved in comparison to pure CPU-based implementation. The paper shows that the speedup factor is significantly improved when using CPU, GPU, and Xeon-Phi. The paper then shows how the different cluster structures can process different 4K frame rates per second.
References


Index Terms

Computer Science  Information Sciences

Keywords

Heterogeneous Architectures, Median Filter, Scheduling of Tasks.