

Cloud-based High Performance Multimedia Processing

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Abstract:

Image and video processing applications became actually unavoidable tools for various domains related to computer vision. Indeed, images and videos are present everywhere (cameras, mobile phones or from other devices). They are used to illustrate different objects in a large number of situations (airports, hospitals, public areas, sport events, etc.). The main inconvenient of image and video processing applications is the high intensity of computation and the complex configuration and installation of the related materials and libraries. In this work, we propose a new framework that allows users to select in a smart and efficient way the computing units (CPU or/and GPU) in a cloud-based platform (hosted on : www.media-process.com), in case of processing single image, multiple images, multiple videos or single video in real time. This framework enables to affect the local or remote computing units for calculation depending on the type of media to process and the algorithm complexity. The framework provides a set of selected CPU and GPU-based computer vision methods [1], such as image denoising, histogram computation, features descriptors (SIFT, SURF), points of interest extraction, edges detection, silhouette extraction, sparse and dense optical flow estimation. These methods are exploited in different applications such as vertebra segmentation in X-ray and MR images [2], gaze estimation [3], event detection and localization in real time [4]. Experimental results have been obtained by applying the framework for the above-mentioned applications showing a speedup ranging from 5x to 200x, by comparison with sequential CPU implementations. In addition to these performances, the parallel and heterogeneous implementations offered lower power consumption as a result for the fast treatment.

Keywords: Cloud computing, GPU, Heterogeneous architectures, Image and video processing, Medical imaging, Motion tracking.

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