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| Thesis Title | Parallelizing Face Identification System Based on Multi-cores CPU and GPU |
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| Abstract | Face recognition is a pattern recognition technique and one of the most important biometrics. The accuracy is not a major problem that specifies the performance of automatic face recognition system alone, the time factor is also considered a major factor in real time environments.<br>Motivated by such challenge, this thesis proposes a Real Time Face Identification System (RTFIS). In doing so, this thesis reviews the state-of-the-art of the face recognition systems and the current parallel processing technologies and available tools. Moreover, this thesis provides the architectural design, detailed design, and implementation of the RTFIS.In order to judge the speed up obtained in adopting recent technologies and parallel processing design patterns, this thesis proposes four variants implementations (models) of the RTFIS, the four variants are performed by using Fisherface algorithm for face recognition and Haar-cascade algorithm for face detection, In addition, these implementations are based on industrial standard tools involve Open Computer Vision (OpenCV) version 2.4.8, Microsoft .Net framework 4, C# programming language, EmguCV version windows universal CUDA 2.9.0.1922,and heterogeneous processing units.<br>The first variant is performed using single core CPU (CPU Mono) to run both detection and recognition phases, second variant is performed by employing multi-core CPU (CPU Parallel) to run both detection and recognition phases, third variant is implemented by employing a combination of single core CPU and GPU (Hybrid Mono) to run detection on GPU and recognition on CPU and the fourth variant is implemented by employing the combination of multi-core CPU and GPU (Hybrid Parallel) to run detection on GPU and recognition on CPU.<br>The experiment consists of applying 400 pictures for 40 persons' faces (10 images per a person), defining, training, and recognizing these pictures on these four variants, the experiment is taken place on the same environment.<br>Finally, this thesis determines the speed up obtained for the three advanced implementations (i.e., Hybrid Parallel model, CPU Parallel model, and Hybrid Mono model) against the convention implementation (i.e., CPU Mono model).The practical results demonstrate that the Hybrid Parallel model gain highest speed up around 82X, CPU Parallel model also have a high speed up around 71X, and finally, the Hybrid Mono model gives a slight speed up about 1.04X. |