



CUDA-Accelerated Face Recognition



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Abstract

We present a GPU based implementation of a face recognition solution using PCA with Eigenfaces algorithm. We explore a strategy for parallelizing and optimizing this computationally intensive, yet well-known algorithm and show the immense speedups that can be achieved by porting the algorithm to the GPU.

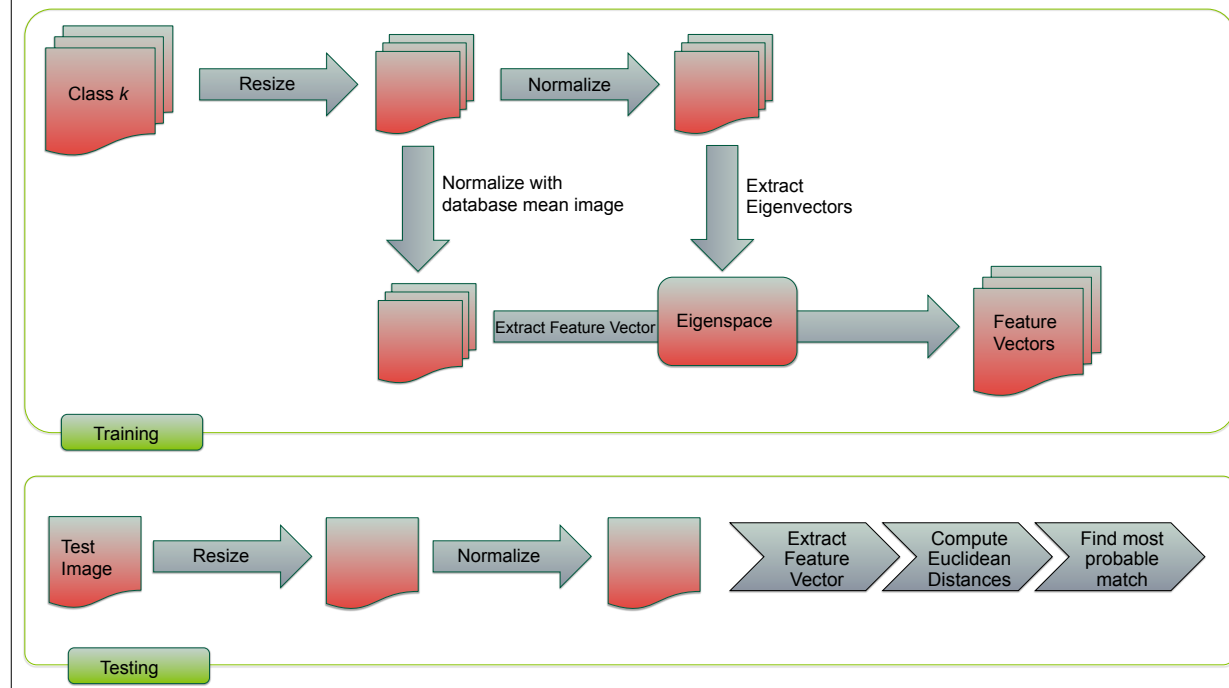
Algorithm

- o Improved PCA with Eigenfaces
- o Training set grouped into classes containing images with different expression, angle, lighting etc.
- o Training process is highly computationally intensive and time consuming.
- o Testing process becomes time consuming as number of images in training set increases.

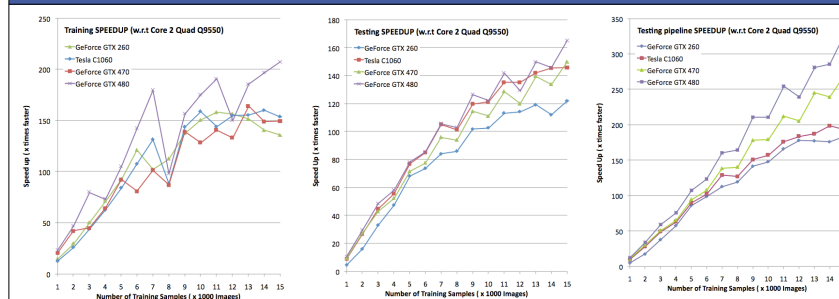
Implementation

- o Extraction of feature vectors in training process is parallelized to process multiple training images concurrently.
- o Extraction of feature vector testing process is parallelized to concurrently compute each element.
- o Computation of Euclidean Distances is parallelized to concurrently process multiple feature vectors.

PCA Overview



Results



- o Highest speedups achieved on GeForce GTX 480 for database for 15,000 images
- o 207x speedup for extraction of feature vectors in training process
- o 330x speedup for recognition pipeline
- o 165x speedup for overall testing process (testing 40 images)