



A First Step to Accelerating Fingerprint Matching based on Deformable Minutiae Clustering*

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Abstract—Fingerprint recognition is one of the most used biometric methods for authentication. The identification of a query fingerprint requires matching its minutiae against every minutiae of all the fingerprints of the database. The state-of-the-art matching algorithms are costly, from a computational point of view, and inefficient on large datasets. In this work, we include faster methods to accelerating DMC (the most accurate fingerprint matching algorithm based only on minutiae). In particular, we translate into C++ the functions of the algorithm which represent the most costly tasks of the code; we create a library with the new code and we link the library to the original C# code using a CLR Class Library project by means of a C++/CLI Wrapper. Our solution re-implements critical functions, e.g., the bit population count including a fast C++ PopCount library and the use of the squared Euclidean distance for calculating the minutiae neighborhood. The experimental results show a significant reduction of the execution time in the optimized functions of the matching algorithm. Finally, a novel approach to improve the matching algorithm, considering cache memory blocking and parallel data processing, is presented as future work.

Index Terms—Fingerprint Recognition, Cache Optimization, Language Interoperability