Removal of periodic geometric structure in the fingerprint minutiae detection

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Background

fingerIDAlg: Accurate and fast algorithm for fingerprint authentication, capable of "match on card", developed by a Portuguese R&D institute in partnership with INCM, which is composed of: i) a template generator and ii) a template matcher.

MINEX III: Certifies algorithms that are compliant with certain criteria, including the non-existence of unnatural periodic structures in the template generator. These structures appear when the generator gives preference to some regions of the image for different reasons (e.g. processing in blocks) and hurts interoperability. This criteria is measured with the **Z value** [1].

Objectives

Here we present and evaluate a simple method which, when added to fingerIDAlg, makes it compliant with the MINEX III criterion of non-existence of unnatural periodic structures.

Proposed solution

1.: Find $x, y \in \{0, ..., K-1\}$ in a pseudo-random way.

2.: Move the image (crop) x, y pixels to the right and down.

3.: Generate the template.

4.: Move the template positions x, y pixels to the left and up.

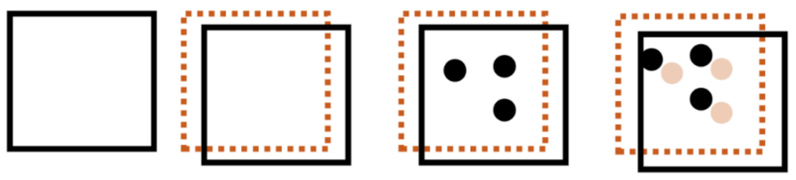

Fig. 1: Diagram of the proposed approach.

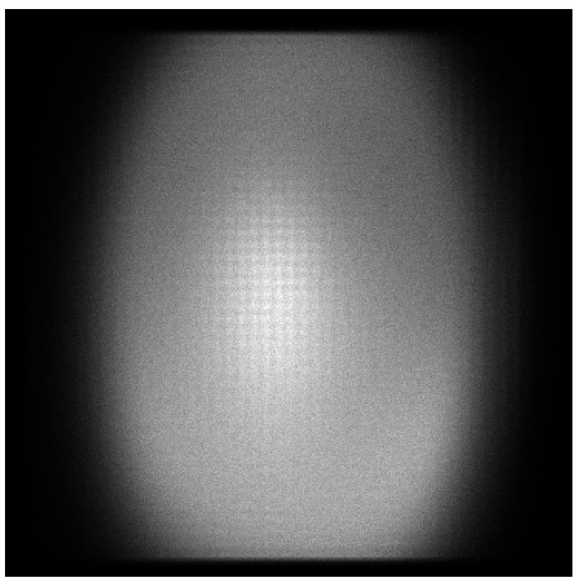

Fig. 2: Before

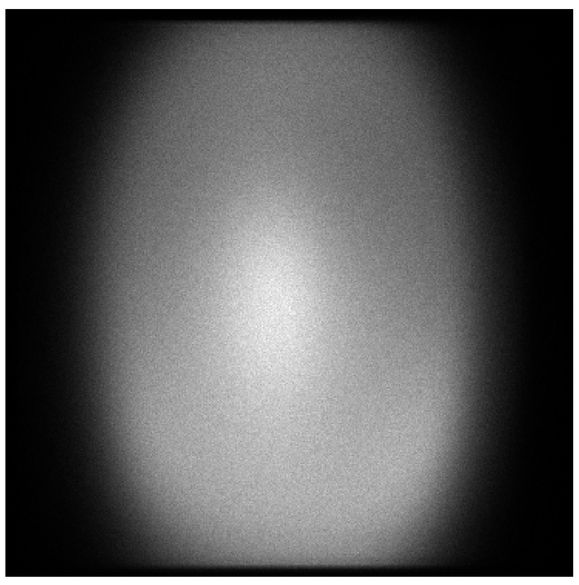

Fig. 3: After

Results - Equal Error Rate

Dataset	Baseline	After Removal
FVC	2.528	2.608
800k	1.807	1.926

Results - Z value

Dataset	Baseline	After Removal
800k	0.0020	0.0010

Discussion

Current: The proposed solution is able to eliminate periodic structures with $1/K$ frequency. It has zero impact in the processing time and a small impact on the accuracy. It is independent of the algorithm used and simple;

Future work: Ideally, the solution would have no impact on the accuracy and work for a large range of frequencies. Future work should also focus on satisfying the other MINEX III criteria.

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References

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