Deep Convolutional neural network for Fingerprint Recognition

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1. Introduction

Fingerprints are ridge and valley patterns present on the surface of human fingertips. Fingerprint matching has played a critical role in identifying suspects and criminals. Due to fingerprints high discriminability and persistence over time, fingerprint-based person recognition systems have been widely deployed. Fingerprint recognition systems have played a crucial role in various applications, including law enforcement, forensics, physical and logical access control, border crossing and civil registry. Fingerprint features can be divided into three major categories based on the granularity at which they are extracted: level 1, level 2 and level 3 features. In this project, we are going to implment a fingerprint recognition system that classify a fingerprin into the following 5 categories: A=Arch, L=Left Loop, R=Right Loop, T=Tented Arch, W=Whorl. As shown in Fig.1

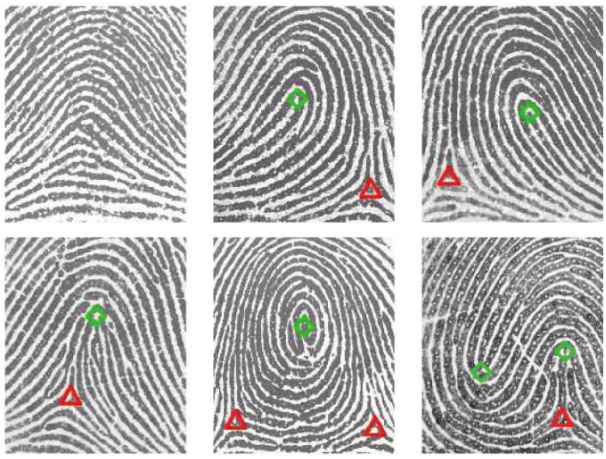

Figure 1. Fingerprint classes: Top row: arch, left loop, and right loop. Bottom row: tented arch, whorl, and twin-loop. Triangles mark deltas; diamonds mark cores and whorls. Note that there is an invisible delta further to the bottom left of the last image, which actually shows a tented-arch-and-loop rather than a twin-loop. These are based on images from the FVC 2000, Database 2a [34].

From the last image in Fig.1 we can see that one fingerprint may be classified into multiple categories at the same time.

2. Motivation

3. Plan

3.1. Deep Learning

In this project, we plan to develop and implement a novel deep learning algorithm for fingerprint claasifications. Specifically, we will implement some state-of-the-art convolutional neural network (CNN) architecture as baselines, such as GoogLeNet [1]. Our goal is to propose a novel approach to classify fingerprints. The innovation of our approach is two-fold:

1) devise some novel CNN architecture that aims at classifying fingerprints, rather than just use some existing CNN

4. Dataset

References

[1] C. Szegedy, V. Vanhoucke, S. Ioffe, J. Shlens, and Z. Wojna. Rethinking the inception architecture for computer vision. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 2818–2826, 2016.