ECE-S 681 Fundamentals of Computer Vision
Final Project

(Due date 03/14/2016 at 2:00pm)

Fingerprints

An unknown person has broken into Bossone and stole all the semiconductors from the second floor labs, prints were taken from the crime scene (FP1~5.png). It is believed that an ECE professor is responsible for such actions, and as a result, investigators take prints of Gerber (01.png), Nasis (02.png), Kalata (03.png), Kandasamy (04.png), Miu (05.png), Nabet (06.png), Tretiak (07.png), Basavaiah (08.png), Chmielewski (09.png), and Cohen (10.png). Investigators have a strong hunch that Professor Cohen is responsible for this heinous crime due to various pieces of evidence left behind; however, Cohen states he has never step foot onto the second floor in years. As a result, the investigators move forward by consulting a fingerprint analyzer, you. So you are given this data base which consists of 10 fingerprints (01~10.png) with fingerprints (FP1~5.png) acquired from the crime scene. Use what you've learned from this class to find the matching fingerprints in the data base.

Figure 1: Finger prints database

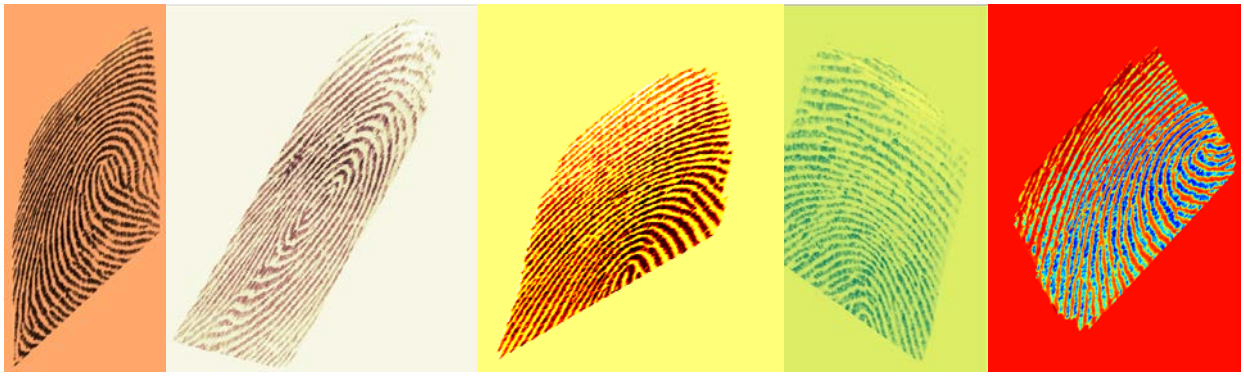

Figure 2: Finger prints acquired on scene

Remarks

The goal of this project is to design an ***automatic*** classifier that can classify finger prints. Therefore, allowing human intervention (for example, picking Minutia points by hands) is against this purpose. However, in the worst case scenario (your program is not able to go fully automatic), you can mark the fingerprint Minutia points manually. Note that in this case, you have to design a user friendly GUI to mark the Minutia points. And also, in this case 20% of your final grade for this project will be deducted automatically.

Resources

Minutia points include:

Ridge ending – the abrupt end of a ridge

Ridge bifurcation – a single ridge that divides into two ridges

Short ridge, or independent ridge – a ridge that commences, travels a short distance and then ends

Island – a single small ridge inside a short ridge or ridge ending that is not connected to all other ridges

Ridge enclosure – a single ridge that bifurcates and reunites shortly afterward to continue as a single ridge

Spur – a bifurcation with a short ridge branching off a longer ridge

Crossover or bridge – a short ridge that runs between two parallel ridges

Delta – a Y-shaped ridge meeting

Core – a U-turn in the ridge pattern

R. M. Bolle, A. W. Senior, N. K. Ratha and S. Pankanti "Fingerprint minutiae: A constructive definition." Biometric Autentication (2002) 58-62

Roli Bansal, Priti Sehgal and Punam Bedi, "Minutiae Extraction from Fingerprint Images - a Review", International Journal of Computer Science Issues, Vol. 8, No. 5, 2012, pp. 74-85.