Biometric Identification System

Group Members:
Chan Tat Wah  00235825
Wong Ting Ho  00235916

Supervisor:
Dr. PengCheng SHI
The function of passwords is to keep something secret. As the technology is increasing, passwords are not safe enough. Therefore, a new password, Biometric Identification, has been introduced. The principle of biometric identification is to use specific body characteristics to identify the user. These body characters are unique to each person, so users can use their body characteristics as password.

There are different biometric identification systems in the market, for example, iris patterns, fingerprints, palmprints, etc. In our project, we considered to use palmprint as the specific body characteristic in the system. We can use simple computer devices, a computer and a scanner, to build up the palmprint identification system. Moreover, the distortion of palmprint is lower because of its larger size. Our Project was to develop a duty-record machine using palmprint identification technology.

In the palmprint identification part, there are several processes that the palmprint image converts into useful format. First, the system gets the outline of the palm by Canny detection. The system locates the position of the middle finger and gets the ROI (Region of Interest).

With the ROI, the system can get the line extraction from it. The system crosses four matrixes with the ROI to form four direction line maps. These four maps combines together to form a final line map of that ROI.

Using the final line map, the system compares it with the line map in the database. The system calculates the similarity of this line map with that in the database by an equation called verification function. If the result is higher that the threshold, the system will identify the user and he/she can pass the system.

Not only the user verification function, the system can have the duty record function. As a result, this system can replace the traditional duty record machine owing to its security function.

The result of our system is quite satisfactory. The FRR (False Rejected Ratio) and the FAR (False Accepted Ratio) are lower than 10%. The system can verify the incoming person whether he/she is the user correctly with more than 90% correction rate.
System Block Diagram

User Login

User ID input

Palm Image Capture from User

Hand Boundary Detection

Orientation Detection

Capturing ROI (Region Of Interest)

Feature Line Extraction

Likelihood Metric

Compare result with the Threshold

Decision Making
1. The False Rejected Ratio (FRR) is shown as follow:
   FRR is the ratio that a corresponding user is being rejected.
   Number of Samples: 60
   Number of acceptances: 56
   Number of rejections: 4
   FRR: 6.67%

2. The False Accept Ratio (FAR) is shown as follow:
   FAR is the ratio that a non-corresponding user is being accepted.
   Number of Samples: 60
   Number of acceptances: 3
   Number of rejections: 57
   FAR: 5%

3. Analysis the system
   a. Pressure problem
      Number of Samples: 20
      Number of acceptances: 19
      Number of rejections: 1
      FRR: 5%

   b. Middle Finger problem
      Number of Samples: 20
      Number of acceptances: 12
      Number of rejections: 8
      FRR: 40%